STATE OF CALIFORNIA

The Resources Agency

Department of Water Resources

DIVISION OF OPERATIONS AND MAINTENANCE

STATE WATER PROJECT ANNUAL REPORT OF OPERATIONS

1978

FOREWORD

This is the fifth in a series of annual reports summarizing the water and power operation of the California State Water Project.[1]

Since January 1965, a "State Water Project, Report of Operations" has been published monthly. These reports are limited to tabulations of daily and monthly data on reservoirs, pumping and generation plant operation, plus data on water quality and water deliveries. The monthly report will continue to provide daily and monthly information to State Water Service Contractors, public agencies, and others.

This annual report summarizes Project facilities in operation during 1978; operational constraints and outages; and significant operations and maintenance events within the five field divisions. Operational data are in the form of annual summaries. Where relevant for comparison, the current and past year's data are shown in charts and tables. Corrections and revisions to the data published in the monthly "State Water Project, Report of Operations" are included.

The history, planning, and description of the State Water Project facilities are detailed in "California State Water Project, Bulletin 200, Volumes I-VI", published by the Department of Water Resources.

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[1] Annual publications of the Department of Water Resources on the State Water Project activities include: (1) State Water Project, Annual Report of Operations, 1978; and (2) The California State Water Project - 1978 Activities and Future Management Plans, Bulletin 132-79.

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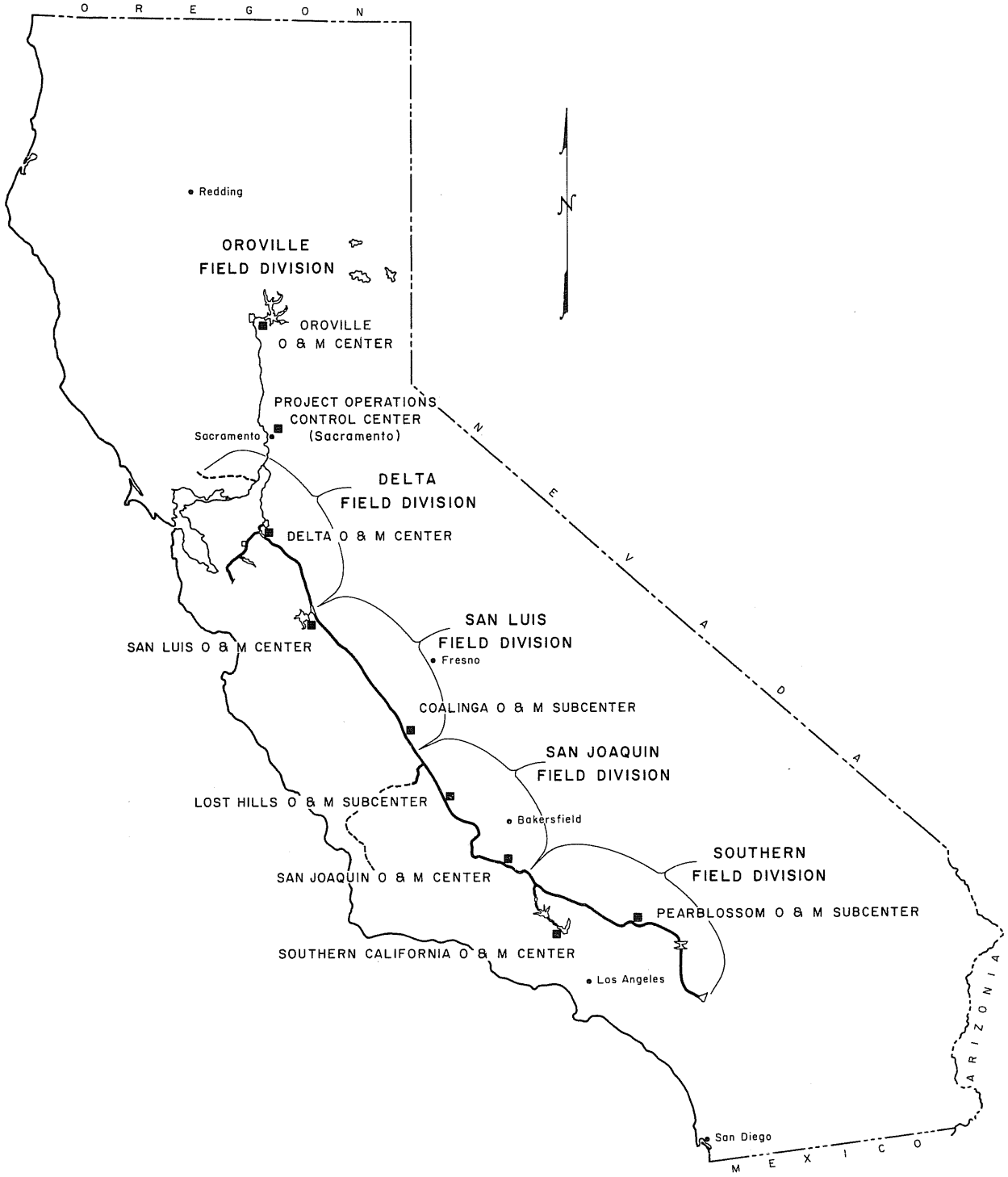
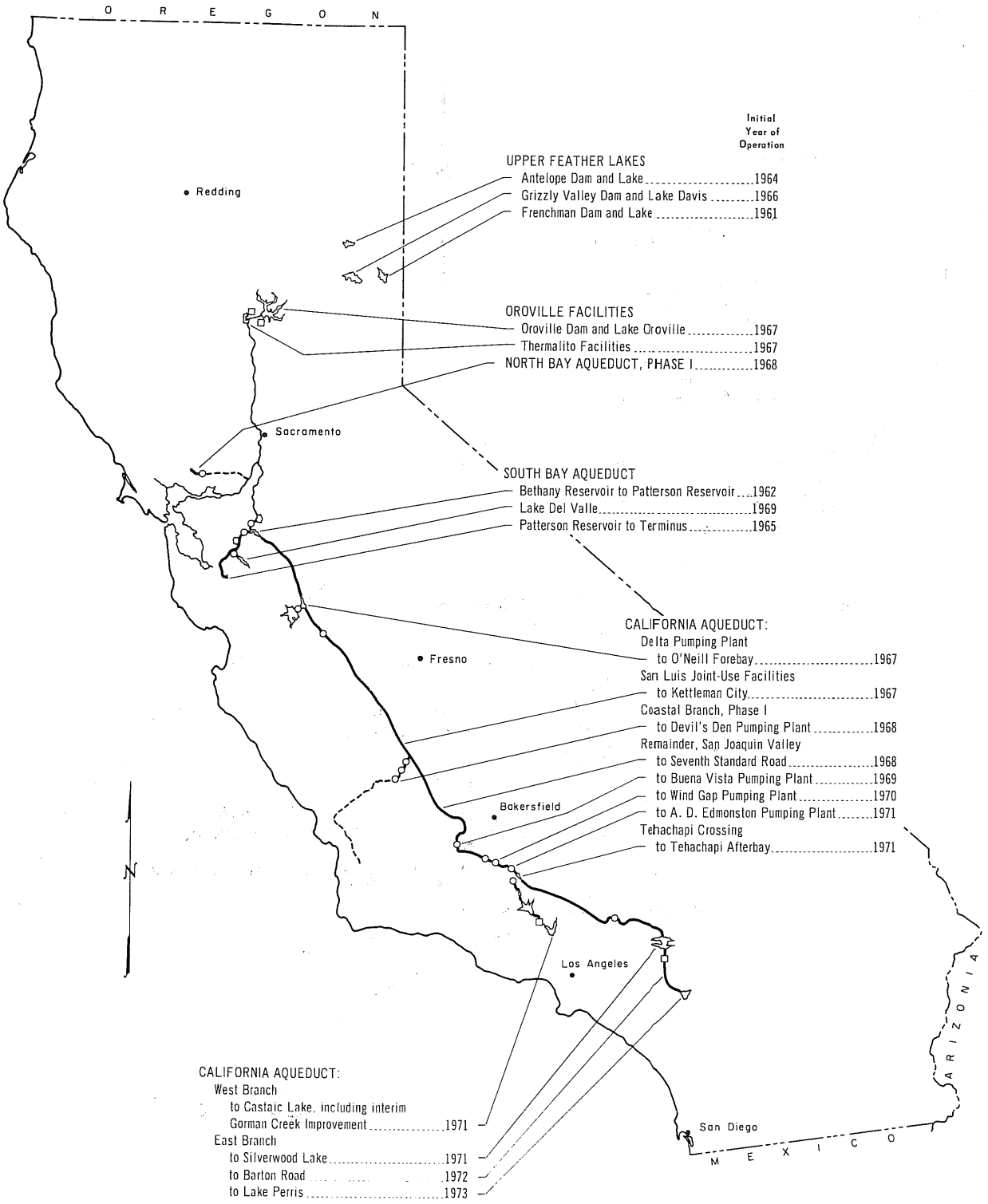
FIELD DIVISION BOUNDARIES



PROJECT FACILITIES



HIGHLIGHTS OF 1978 OPERATION

Water Conditions

During the 1977-78 water year (October 1, 1977 through September 30, 1978) statewide precipitation was 155 percent of normal, a welcome shift from the drought pattern of the previous two years. From mid-December 1977 through April 1978, storm systems moved across the Pacific on a wide path at mid-latitudes to strike California broadside. Additional systems, formed at lower latitudes in the eastern Pacific, brought torrential rains with subsequent floods and mud slides to Southern California. The resulting effect from these various storm systems was a seemingly unbelievable recovery from the drought which had gripped the State during the previous two years.

Statewide runoff of California streams averaged 158 percent of normal during the 1977-78 water year. Based on the State Water Resources Control Board's (SWRCB) criteria in Decision 1485 of August 1978, the classification of the 1977-78 water year was "wet". This classification of a year is indexed by the sum of the unimpaired runoff computed for the Sacramento River near Red Bluff, the Feather River into Oroville Reservoir, the Yuba River at Smartville, and the American River into Folsom Reservoir. The computed index for the 1977-78 water year was 23,807,000 acre-feet.

Precipitation was the heaviest on record in the southern San Joaquin Valley, with a 200 percent of normal snowpack in the watersheds of the southern Sierra Nevada.

In the Feather River Basin, water year precipitation was 141 percent of normal, maximum snowpack water content was 130

percent of normal, and basin unimpaired runoff was 131 percent of normal.

Further details of water supply conditions during the 1977-1978 water year are available in the Department of Water Resources' Bulletin 202-78, "Water Conditions and Flood Events in California, Water Year 1977-78".

Water Deliveries and Reservoir Storage

Water deliveries from State Water Project (SWP) facilities during the 1978 calendar year totaled 1,616,548 ac-ft, excluding deliveries to satisfy prior water rights and to federal customers. This total was an increase of 73 percent over the water deliveries made during the drought year 1977.

Besides State water service contractors' requested entitlement water and local water, 1978 water deliveries included classification types of water not available during 1977 due to the drought conditions. Types of water not delivered in 1977 but included in the 1978 water delivery total were:

- Surplus water.
- Repayment water for preconsolidation water used during SWP construction.
- Water for ground water recharge.

Also, as carryover from the 1977 drought conditions, the 1978 water delivery total included:

- Makeup water, which was entitlement water not delivered in 1976 and 1977 as a result of reductions to requested entitlement deliveries necessitated by the drought in those years.

- Carryover entitlement water, which was entitlement water allocated to several contractors for delivery in 1977, but which, at the request of the contractors, was not delivered until 1978, under specially formulated cost agreements.

- Metropolitan exchange water, which was SWP water made available to agencies facing critical water shortages in 1977, under a program by which the Metropolitan Water District of Southern California pumped and used additional Colorado River water in lieu of a portion of their SWP entitlement water. The program was carried over from 1977 into 1978.

- Emergency relief water, which was water held in SWP reservoirs at the end of 1977, to be made available for an extension of the 1977 emergency drought relief program in the event the drought were to continue into 1978. When it became apparent in early 1978 that the drought had ended, the water was sold.

Water delivered to federal customers from the joint facilities totaled 910,522 ac-ft for the year, up 182 percent over deliveries made during the 1977 drought year. In addition, 8,387 ac-ft of federal water was wheeled through SWP facilities for delivery to the Kern County Water Agency's Cross Valley Canal, down 73 percent from 1977 when drought conditions limited local supply.

Water delivered from SWP facilities to satisfy prior water rights within the Feather River service area totaled 787,893 ac-ft, up 38 percent over that delivered in 1977 when the service area users took up to a 50 percent reduction in deliveries due to the drought conditions. In addition, 191,826 ac-ft of natural flow was released through the SWP's southern reservoirs, almost six times the amount released from these same reservoirs during the previous two drought years.

A summary of water deliveries for SWP facilities by years to individual agencies is shown in Section I, page I-2.

At the beginning of the 1977-78 water year, storage in SWP reservoirs was at a record low. By May, all SWP reservoirs south of the Delta were essentially full, illustrating the dramatic recovery from the effect of the 1976-77 drought.

Lake Oroville reached its maximum storage of the year, 3,407,512 ac-ft, on June 11. This maximum storage was 114,286 ac-ft below Lake Oroville's maximum operating storage. Minimum storage, 1,119,917 ac-ft, was recorded January 1. Maximum computed bi-hourly inflow to Lake Oroville, 57,026 cubic feet per second, occurred on March 5. Maximum release from the Oroville-Thermalito Complex down the Feather River was limited to 32,529 cfs over a 10-day period beginning March 7. Despite an inflow total of 4,789,064 ac-ft, there was no spill from Lake Oroville during the year.

The SWP's storage in San Luis Reservoir ranged from 417,826 ac-ft, 49 percent of the Project's share of the capacity, on January 1, to 1,069,034 ac-ft, 101 percent of SWP's share of the capacity, on April 3. To ensure San Luis Reservoir being full at the beginning of the irrigation season, the SWP pumped additional water into San Luis Reservoir to compensate for its share of the evaporation losses through the period of the Bureau of Reclamation's (USBR) completion of their filling operation.

The Kern River Intertie, in its first operation since completion in 1976, diverted 177,931 ac-ft of water from the Kern River and Friant-Kern Canal into the California Aqueduct between April 6 and June 28, to create space in Isabella Reservoir for anticipated snowmelt runoff. As in 1969, when Kern River flood

water was pumped into the Aqueduct, provisions were made to convey the water up to 50 miles north for delivery to State water service contractors. Although the forecasted volume of snowmelt runoff did not fully materialize, the operation relieved Lake Isabella, enabling it to contain the remaining snowmelt runoff. This operation prevented possible flooding of Tulare Lake, and provided the Project an overall energy saving in reduced pumping of a like amount of water from the Delta.

This year's local inflow to West Branch reservoirs, Pyramid and Castaic Lakes, and Elderberry Forebay, totaled 227,888 ac-ft. To reduce downstream flows and the potential for flood damage, 136,228 ac-ft of this local inflow went to storage in West Branch reservoirs. Storage in Lake Castaic reached its maximum of 320,359 ac-ft on April 26, a new record. Minimum storage, 50,840 ac-ft, was recorded on January 3.

On the East Branch, new records of maximum storage were set, due to high local flows and the availability of water from the Delta and the Kern River Intertie. Storage in Silverwood Lake ranged from 44,128 ac-ft, on January 2, to 73,513 ac-ft on February 12, 481 ac-ft above its normal operating storage. Lake Perris reached its maximum storage for the year, 120,147 ac-ft, a record, on May 10. Deliveries and losses drew Lake Perris down to its minimum storage, 68,200 ac-ft, on September 21.

To make use of the availability of this year's ample water supply, two ground water recharge demonstration projects were initiated. In cooperation with the Mojave Water Agency, 23,654 ac-ft of SWP water were stored in the Mojave Ground Water Basin. The Agency will have this water for use through 1982, in lieu of

receiving SWP water conveyed by surface facilities. Likewise, in a demonstration program with the San Bernardino Valley Municipal Water District (SBVMWD), 9,246 ac-ft of SWP water were delivered for storage in the Bunker Hill Basin. Up to a total of 50,000 ac-ft of SWP water is to be stored for SBVMWD in the Bunker Hill Basin so that it can be pumped as directed by the SWP in lieu of surface deliveries.

Project Energy Generation and Use

Generation from the SWP's five power plants during the year grossed almost 2.9 billion kilowatthours (see chart entitled "Project Gross Power Generation", page VI-1). In 1978, generation at the Oroville-Thermalito Complex and the SWP's other power recovery plants (San Luis, Castaic and Devil Canyon) was up over 400 percent above that generated during the 1977 drought year, and was about 95 percent of the average generated by the five plants during the 5-year period 1973-77. Monthly generation totals for each plant are presented in Section VI.

With the extra reservoir filling following the two years of drought, the SWP's use of energy was the largest since operation began, 4,461,296,000 kilowatthours. SWP power uses by field divisions and sources are shown on the chart entitled "Project Power Operation", page VI-2. A summary, by month, of the energy used at each plant is presented in Section VI.

Included in the 1978 energy use total is 53.09 million kilowatthours used at the Metropolitan Water District's (MWD) Julian Hinds Pumping Plant. This pumping was part of the contingency preparations made in case the drought extended into 1978. As in

1977, the electric utilities provided this energy at rates similar to those under the Project's Suppliers' Contract.

Also included in the 1978 power operation was the use by Pacific Gas and Electric Company (PGandE) of San Luis Pumping/Generation Plant for peaking capacity during power emergency situations. PGandE made use of the San Luis facilities eight days from May through September and in turn provided energy during off-peak periods to pump the water used for its emergency generation back into San Luis Reservoir (or an equivalent amount of energy for use in operating SWP pumping plants).

PROJECT STATUS IN 1978

Project Facilities

The State Water Project conserves water for distribution to much of California's population and to irrigated agriculture. It also provides generation of electric power, flood control, water quality control, new recreational opportunities, and enhancement of sport fisheries and wildlife habitat.

The first SWP facilities to become operational were Frenchman Dam and Lake in the Upper Feather River region and the South Bay Aqueduct in the San Francisco Bay Area in 1962. By 1973, construction of the initial facilities of the SWP was complete. This provided for operation of the entire SWP facilities from Plumas County in the north to Riverside County in the south.

During 1978, water was delivered from SWP facilities to: 21 State water service contractors; 5 noncontractors; 5 USBR customers along the San Luis Joint Facilities in addition to 9 agencies served federal water via the Cross Valley Canal; and 8 local agencies receiving water to satisfy prior water rights.

SWP facilities in operation during 1978 included: 20 reservoirs with a gross capacity of 6,763,242 ac-ft; 5 power plants with a gross output capacity of 1,354 megawatts; 16 pumping plants housing 112 units with a total motor rating of 2,420 megawatts; and 540 miles of Aqueduct.

Outages and Operating Limitations

Major outages of SWP facilities and operating limitations affecting the 1978 operation in chronological order were:

January 1 - 9, Edward Hyatt - Powerplant units were limited to block loading due to the low water surface level of Lake Oroville. On January 9, Automatic Dispatch control was resumed by PGandE, its use having been discontinued since July 25, 1977.

February 8 - March 10, the South Bay Aqueduct was dewatered between Patterson Check and the Del Valle Check for inpecting snd sealing joints and cracks in the canal sections, repairing a leak at Arroyo Seco Siphon, and inspecting the Arroyo Mocho Siphon. Deliveries below the dewatered section were met from Lake Del Valle releases.

February 10 - March 20, Las Perillas Pumping Plant was out of service for the removal of flood flow debris in the forebay and downstream canal sections, and to replace washed out concrete lining sections of the California Aqueduct. Although the road to the plant was destroyed by the flood flows, there was no structural damage to the plant itself.

May 1 - July 31, SWP exports from the Sacramento-San Joaquin Delta were limited to a daily average of 3,000 cfs during May and June and 4,500 cfs during July. This limitation was in compliance with an interim agreement with the State Department of

Fish and Game for the SWP to curtail exports from the Delta to the maximum degree practical each year during the peak of striped bass spawning. This year the Department of Fish and Game requested the limitation in lieu of a 5-week minimum pumping period which had been previously used.

May 4 - June 28, pumping at the Delta Pumping Plant was limited to meeting demands generally north of Buena Vista Lake (Check 24) to accommodate snowmelt runoff let into the California Aqueduct through the Kern River Intertie.

August 18, deliveries from Pool 21 were halted and those below Pool 21 were curtailed after a crop dusting plane crashed in Pool 21. The plane carried a mixture of 4 gallons of Dibrom, 8 gallons of Kelthane, and 288 gallons of water. During the removal of the craft from the Aqueduct, about 200 gallons of the substance spilled into the pool. Although there was no health hazard, domestic water customers below Pool 20 were advised not to resume taking water until after the contaminated water had passed their turnout.

October 2 - November 15, Delta Pumping Plant exports were limited during an experiment where SWP exports were limited in lieu of constructing the rock barrier at the head of Old River.

SACRAMENTO-SAN JOAQUIN DELTA OPERATIONS

The 1978 Sacramento-San Joaquin Delta operation began with the finalization of plans for dealing with a continuation of the 1976-77 drought. Fortunately, there were sustained high Delta inflows during the early part of the year which nullified the need for these plans. When it became evident that the drought had ended, efforts were concentrated on returning the Delta to predrought conditions. This included the removal of the rock barriers. Exports were maximized by both the Central Valley Project (CVP) and SWP until San Luis Reservoir storage was replenished, the SWP share in March and the CVP share in April. Exports were then limited to demands until May when both projects limited their exports to minimize the diversion of young striped bass (see page 8 for export limitations).

Delta operations were initially directed by the water quality objectives of the SWRCB's Emergency Regulation issued December 15, 1977. On February 9, the Emergency Regulation was repealed, and Delta operations were again controlled by the Basin Plans and SWRCB's Decision 1275 as amended by Decision 1291. These in turn were replaced by Decision 1485, adopted by SWRCB August 16. Despite these changes which took place during the year, with only a few minor exceptions all of the applicable water quality standards were met in 1978. Figure A, page 12, "Water Quality Objectives and Pertinent Conditions, 1978" shows plots of some of the controlling objectives and corresponding recorded daily values.

Coordinated operations, in which flows in the Delta are controlled by releases from upstream CVP and SWP reservoirs,

extended from June 23 through August 31. During this time, the two agencies mutually agreed "balanced water conditions"[2] existed. The determination for prorating the release each agency made was based on the draft agreement, "Supplemental Agreement Between the United States of America and the State of California for Coordinated Operations of the Central Valley Project and the State Water Project", dated May 13, 1971. By a letter dated December 28, 1977, both agencies had agreed to operate during 1978 as if this coordination agreement had been executed, except for agreed-upon specific modifications. Figure B, page 13, shows CVP-SWP Delta coordinated operations.

Table 1, page 14, tabulates by months the routing of water released from CVP-SWP upstream reservoirs to the Sacramento, Feather, and American Rivers. The water flowing to the ocean, represented by the Delta outflow index, provides a hydraulic barrier of fresh water to the more saline water of Suisun Bay, in order to maintain Delta water quality at required levels. During "balanced conditions" any water in excess of that needed for in-basin use (including Delta consumptive use and the Delta outflow index) was available for export from the Delta in accordance with the terms in the coordination agreement. Figure C, page 15, presents a comparison of Delta inflow and CVP-SWP reservoirs releases and exports.

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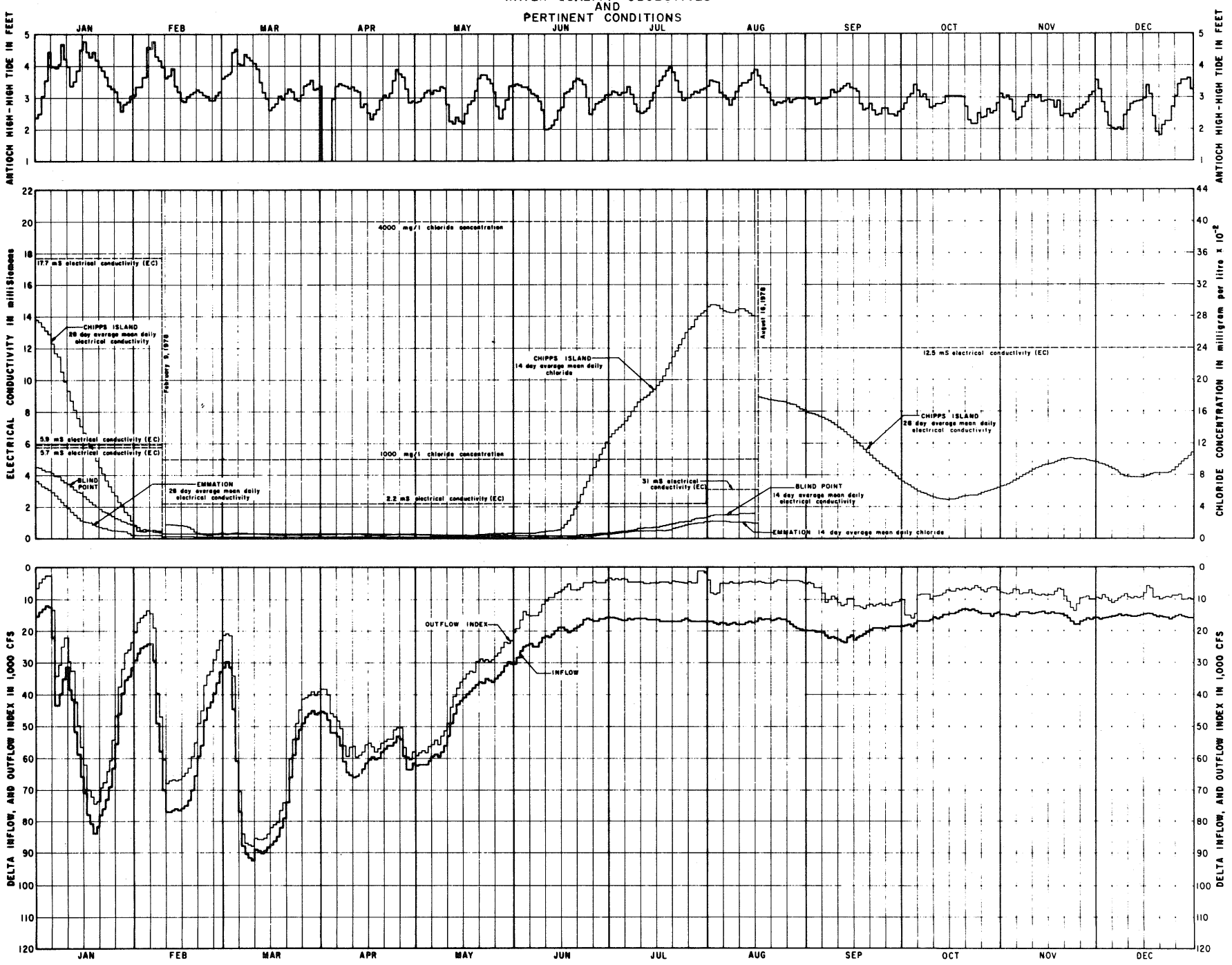
[2] "Balanced water conditions" occur when it is agreed by USBR and DWR that the releases of water from upstream CVP and SWP reservoirs, plus other inflows, approximately equal the water supply needed to meet Sacramento Valley in-basin use, including water quality objectives and exports.

FIGURE A

WATER QUALITY OBJECTIVES AND PERTINENT CONDITIONS



1978

FIGURE B

1978 CVP - SWP COORDINATED OPERATION

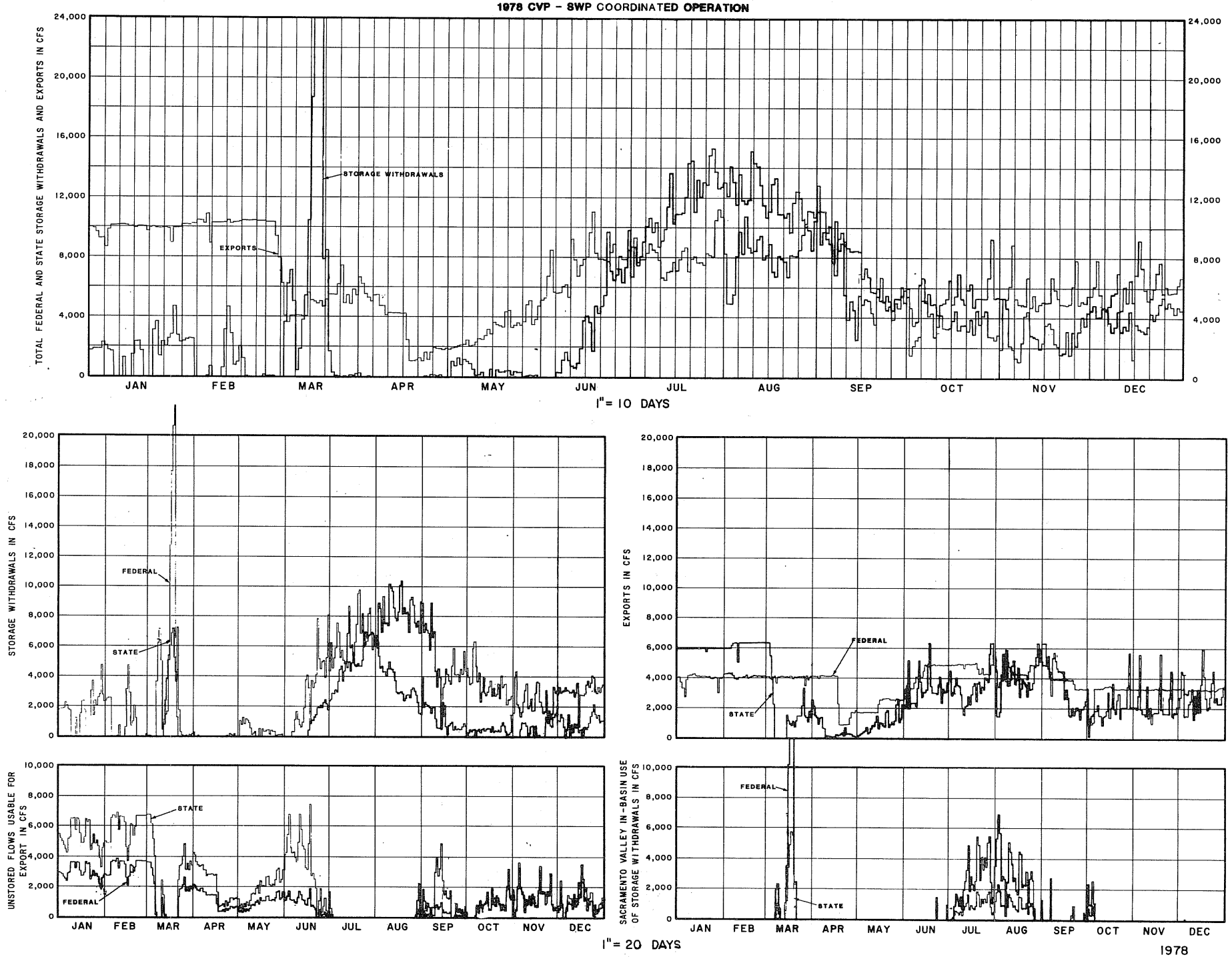


TABLE 1

SACRAMENTO BASIN AND SACRAMENTO–SAN JOAQUIN DELTA OPERATION FOR 1978

(thousands of acre-feet except as noted)

Month	UPSTREAM RESERVOIR RELEASE			Sacramento River In-Basin Use 2/	DELTA INFLOW			DELTA USES			DELTA EXPORTS		
	Keswick 1/	Oroville 1/	Nimbus 1/		Sacramento River at 3/ Sacramento	San Joaquin River at 3/ Vernalis	Total Delta Inflow	Delta Consumptive Use 4/	Delta Outflow Index		Total Exports	Exported by State-DWR	Exported by Federal-USBR
									Thousands of acre-feet	Average cfs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
January	356	55	163	2,236	2,813	154	2,967	−56	2,416	39,294	607	366	241
February	495	63	260	1,641	2,459	440	2,899	−37	2,364	42,565	573	344	229
March	973	570	455	1,392	3,389	762	4,151	−10	3,802	61,835	356	109	247
April	490	331	303	1,121	2,245	1,211	3,456	63	3,192	53,641	200	32	168
May	549	252	403	346	1,549	1,217	2,766	121	2,450	39,842	193	59	134
June	488	142	201	−69	762	469	1,231	191	578	9,713	450	195	255
July	624	259	162	−134	910	139	1,049	268	276	4,495	503	210	293
August	681	239	152	−59	1,013	83	1,096	252	323	5,253	517	242	275
September	427	179	182	310	1,098	135	1,233	174	614	10,327	444	211	233
October	369	150	113	128	760	189	949	118	515	8,381	318	128	190
November	349	135	75	150	709	203	912	55	526	8,832	332	135	197
December	369	166	78	172	784	164	948	2	574	9,336	374	172	202
TOTAL	6,170	2,541	2,547	7,234	18,491	5,166	23,657	1,141	17,630	24,353	4,867	2,203	2,664

1/ Releases to river

2/ Positive values show accretions; negative values show depletions.

3/ Column 5 and 6 are based on daily 6 a.m. readings. Columns 1, 2, 3, 12 and 13 are based on measured total daily flow.

4/ From Consumptive Use Table dated April 9, 1979.

1000 acre-feet = 1,2335 cubic hectometres

1000 cubic feet per second = 28.317 cubic metres per second

FIGURE C

SACRAMENTO - SAN JOAQUIN DELTA
MONTHLY OPERATIONS
EXPORTS - RESERVOIR RELEASES - DELTA OUTFLOW INDEX

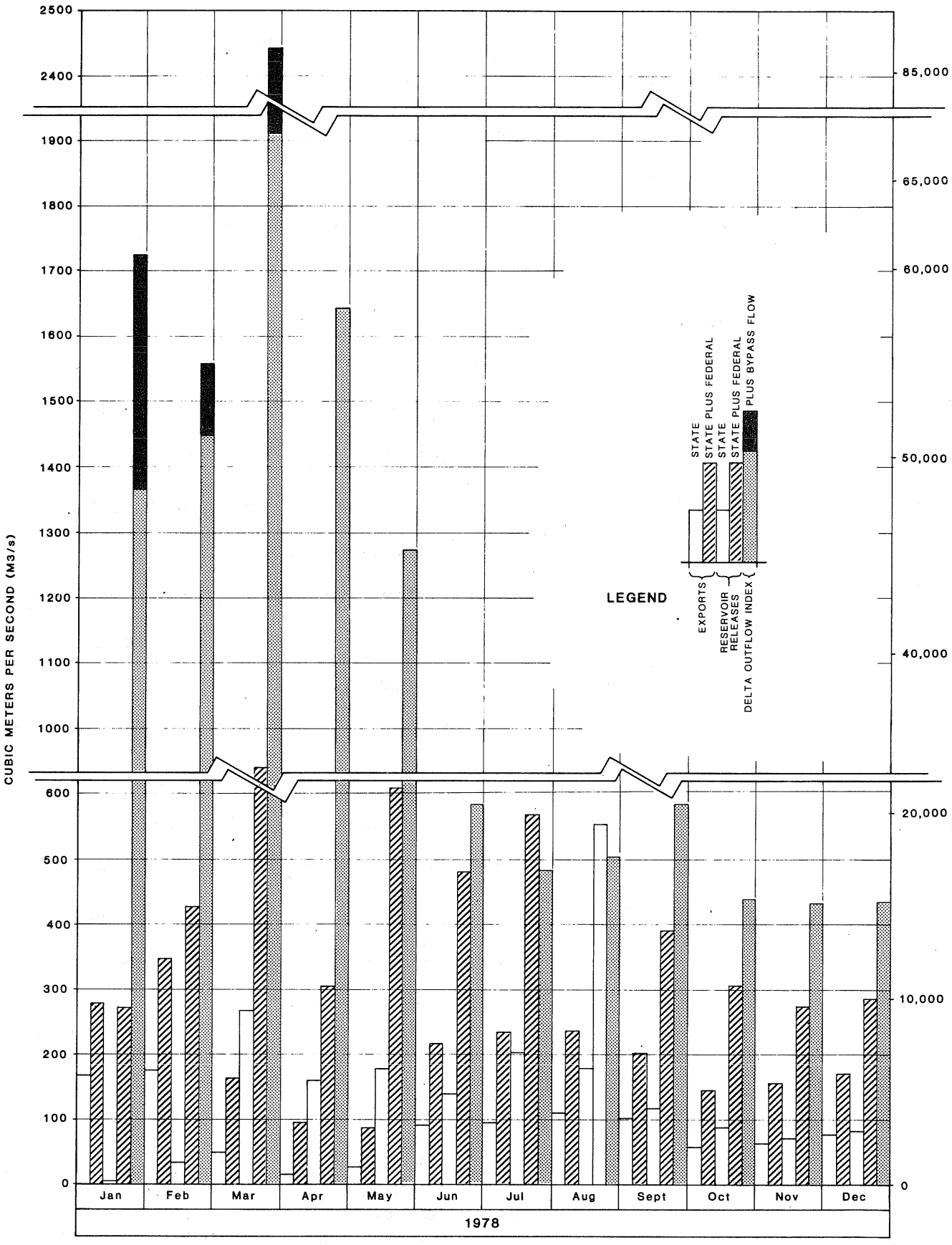


Table 2, page 17, is a tabulation of the daily computed "Delta outflow index". This index only reflects inflows past Sacramento at "I" Street and San Joaquin River near Vernalis. Beginning August 16, with the adoption of the SWRCB's Decision 1485, the index has been revised to reflect diversions of the Byron-Bethany Irrigation District from the Clifton Court Forebay as part of the Delta's consumptive use.

Delta Operations for Special Studies

Two special studies were undertaken in the Delta in 1978, affecting operations there. The earliest was a study during the period from late June through early September, initiated by the Four Agency[3] Delta study group. The objective of this three-month study was to verify that maintaining the average location of the entrapment zone adjacent to the Upper Honker Bay Area (Lower Chipps Island) would enhance growth of phytoplankton and increase total fish productivity in Suisun Bay and the western Delta. The entrapment zone is the interface between saline water from the ocean and fresh water flowing from the Delta. The study was conducted between June 30 and the first week of September when the Delta outflow index was held between 5,000 and 7,000 cfs. The index began exceeding these limits in early September when return flows along the Sacramento River system surpassed the capacity of the Tracy and Delta Pumping Plants to control the Delta outflow.

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[3] California Department of Water Resources; U. S. Bureau of Reclamation; U. S. Fish and Wildlife Service; and California Department of Fish and Game. The studies are part of an ongoing interagency ecological study program, and detailed descriptions of progress of the studies are published annually by the four cooperating agencies.

TABLE 2

DELTA OUTFLOW INDEX 1978

DAY	JANUARY Actual	FEBRUARY Actual	MARCH Actual	APRIL Actual	MAY Actual	JUNE Actual	JULY Actual	AUGUST Actual	SEPTEMBER Actual	OCTOBER Actual	NOVEMBER Actual	DECEMBER Actual
1	6634	20330	21505	38896	59004	20815	3986	4317	5502	10034	7923	9590
2	4992	17229	21144	38808	58295	19933	4046	8254	5261	15006	8097	9966
3	3839	15724	21871	40335	57674	16719	3994	8633	5302	14899	8504	8620
4	2928	15010	34361	46311	58484	14125	4055	8386	6923	15536	7967	9537
5	2914	13612	52534	47074	56529	15229	3869	5033	6881	14197	6649	10794
6	13639	14297	70907	48659	55889	15514	4079	5062	8584	8179	7168	11034
7	34671	19065	84423	51146	54140	15608	4945	5072	11404	8117	8609	10471
8	30590	39756	87455	56175	56187	15671	4866	4928	10848	8109	8346	9752
9	25128	47619	88219	59589	53268	14126	4958	5033	9405	8134	8130	9085
10	22133	61251	88716	56635	51842	11855	4980	5021	10059	9553	7261	8302
11	29826	68445	86027	59272	49471	10512	4913	5072	11380	8790	8191	9367
12	32365	67661	86227	59990	44482	9446	5014	4989	12364	8712	8572	9622
13	42450	67431	86256	59107	40921	9445	5222	5022	12299	8322	8852	9184
14	49777	67392	85839	58243	38185	8249	5006	4982	10321	7629	8581	9228
15	56418	67349	84673	55877	36202	7386	5024	5014	10228	6787	8852	9194
16	62033	66184	82564	55285	35058	7176	5010	5166 1/	12056	7322	8667	8073
17	69958	65327	81506	56468	33812	6377	4988	5164	12028	7255	8534	5875
18	72262	63630	80773	58520	32827	5568	4992	5125	12332	6395	7304	6884
19	74589	60079	76650	57345	33022	7075	4952	5164	12550	6763	6384	9587
20	73522	55875	74054	55382	29781	7238	5032	5145	11755	6693	7032	9452
21	69206	49424	68657	54814	29050	7330	4621	5120	11640	6575	9195	10283
22	67309	45715	60173	54110	29841	6668	4692	4918	11730	6682	10859	9965
23	64023	37690	53966	54007	29420	5029	4997	4403	11476	6399	11899	9354
24	60644	34032	49044	51122	29935	5004	4986	4617	11165	5785	12713	9431
25	54115	32944	45277	50560	29663	5034	4971	4579	11432	6125	11271	8895
26	46704	29376	41988	50680	28212	4961	4882	4608	11473	7214	9714	8968
27	37567	26298	41597	56541	27407	5012	5029	4566	11626	7613	9388	8644
28	32044	23069	40742	59872	25501	5051	4965	4582	10818	6609	10185	10175
29	26599		39675	60393	23903	5019	2104	4822	10734	6520	10021	10030
30	25882		40477	58006	23838	4217	1981	4889	10228	6544	10105	9984
31	23352		39600		23264		2172	5165		7315		10070
TOTAL	1218113	1191814	1916900	1609222	1235107	291392	139331	162851	309804	259813	264973	289416
AVERAGE	39294	42565	61835	53641	39842	9713	4495	5253	10327	8381	8832	9336
MAXIMUM	74589	68445	88716	60393	59004	20815	5222	8633	12550	15536	12713	11034
MINIMUM	2914	13612	21144	38808	23264	4217	1981	4317	5261	5785	6384	5875
TOTAL AC-FT	2416127	2363963	3802171	3191892	2449835	577976	276363	323015	614496	515339	525574	574057

Values in cfs - days except where noted

1/ Computations revised to reflect adoption of SWRCB's Decision 1485

ANNUAL

Total Delta Outflow Index 8,888,736 cfs-days
17,630,808 acre-feet

Delta Outflow Index
Average 24,353 cfs-days
Maximum 88,716 cfs-days
Minimum 1,981 cfs-days

The second study began October 2. It was a three-week test conducted to minimize the detrimental effects of flow reversal and low levels of dissolved oxygen on the salmon runs of the San Joaquin River. It was done in lieu of installing the Old River Barrier. During the first four days of the test, diversions into Clifton Court were stopped and Tracy Pumping Plant exports were minimized. Exports during the first half of the test were adjusted to ensure a calculated flow of from 500 to 700 cfs past Brandt Bridge on the San Joaquin River. San Joaquin River flows were sufficient to require no curtailments during the latter part of the test.

PROJECT OPERATIONS

The normal SWP operations of reservoir filling and water delivery were hampered in early 1978 by the necessity for extensive cleanup and repairs to facilities damaged by the heavy storms through the first four months of the year. The reservoir filling operations south of the Delta were essentially concluded by mid-April, although some filling of Lake Perris continued into May. This was a welcome situation after two years of drought. However, during the spring snowmelt runoff period, full southern reservoirs created a limit on the amount of water that could be diverted through the Kern River Intertie to demands south of the Intertie. To increase diversion of water through the Kern River Intertie, pumps were installed in the California Aqueduct to pump the water north (see San Joaquin Field Division, page 39). To allow additional diversions through the Kern River Intertie, arrangements were made for the Metropolitan Water District (MWD) to take some of the Kern River water through the SWP in lieu of pumping from the Colorado River (see San Joaquin Field Division, page 39).

SWP water delivered including entitlement, carryover, exchange repayment and 16,914 ac-ft of surplus[4] water totaled 1,580,984 ac-ft. This total represented a 73 percent increase over all water delivered during the drought year 1977. In addition, local water delivered from SWP facilities totaled 35,564 ac-ft, up 88 percent from that delivered in 1977. Figure D, page 21, shows by months the water supply available to the SWP and its general distribution during the year to storage, deliveries and losses.

Project and local water delivered to each of the major service areas during 1978 compared to 1977 deliveries were:

1978 Deliveries

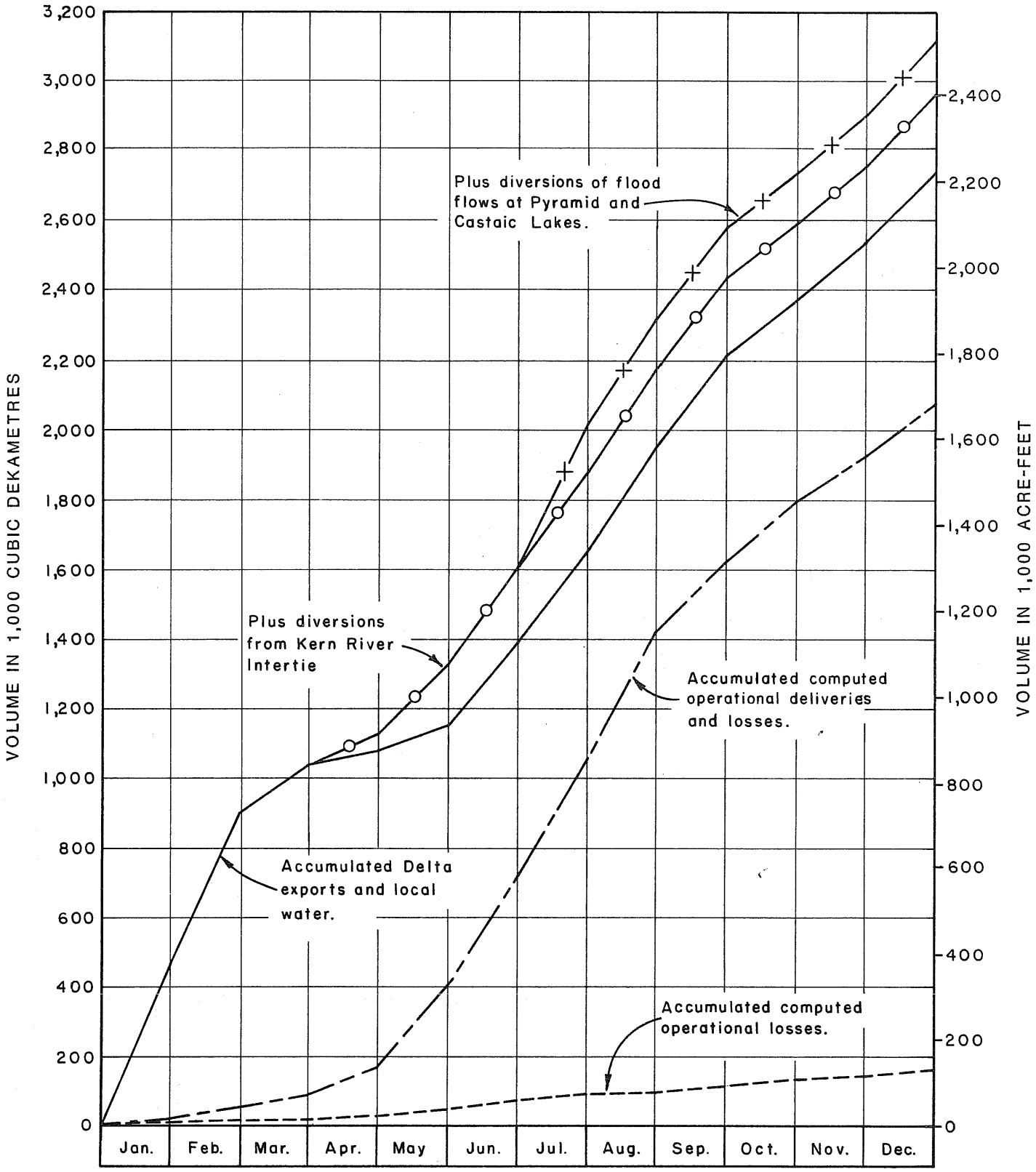
Service Area	ac-ft	Percent Change from 1977 Deliveries
Feather River	13,490	73
San Franciso Bay	136,594	8
San Joaquin Valley	769,351	42
Southern California	697,113	170
Total	1,616,548	73

[4] Of the surplus water delivered to State water service contractors, 8,629 ac-ft was extra surplus water (extra surplus water is water not required for Delta water quality requirements or SWP needs and that can be delivered with SWP excess capacity for ground water replenishment or agriculture use in lieu of ground water pumping). Agencies and deliveries of extra surplus water were:

Agency	March	April	Total
Kern County Water Agency	2,757	5,866	8,623 ac-ft
Oak Flat Water District	0	6	6 ac-ft
Total	2,757	5,872	8,629 ac-ft

Figure D

STATE WATER PROJECT OPERATIONS IN 1978
ACCUMULATED EXPORTS AND DELIVERIES



Preconsolidation repayment water delivered amounted to 2,430 ac-ft, reducing the amount left to be delivered by 1985, under the 1964 contracts to:

J. G. Boswell	- 84,895 ac-ft
Belridge Oil Company	- 57,977 ac-ft

A table showing water deliveries by year for individual State water contracts is presented in Section I, page I-2.

Water deliveries to federal customers from the Joint Facilities totaled 910,522 ac-ft, up 182 percent over the drought year 1977 deliveries. In addition, 8,387 ac-ft of USBR water was wheeled to the Cross Valley Canal in compliance with the three-party (the United States, the State, and 9 water agencies) contract, down 73 percent from that wheeled in 1977, due to availabilty of local water.

Water delivered from the Oroville-Thermalito Complex to satisfy prior water rights totaled 787,893 ac-ft, up 43 percent over 1977 deliveries. Natural flow passed through the Project's southern reservoirs to satisfy prior water rights totaled a record 191,826 ac-ft.

Oroville Field Division

Upper Feather River Reservoirs

Only Antelope Lake of the three upper Feather River reservoirs filled and spilled this year. Antelope Lake has spilled every year except 1977, since its original filling in 1965. The following table shows the 1978 range in storages of the three Upper Feather River reservoirs.

Upper Feather River Reservoir Storage

in ac-ft

Reservoir	Maximum	% of Capacity	Date[3]	Minimum	% of Capacity[2]	Date[3]
Antelope Lake[1]	23,498	104[4]	5/15	3,927	17	1/1
Frenchman Lake	28,404	51	5/22	8,178	15	1/1
Lake Davis	64,893	77	6/4	35,479	42	1/1

1 Antelope was drained in the fall of 1976.
2 Maximum operating storage.
3 Date storage initially was reached.
4 Spilling.

A graph depicting monthly storage values of the three Upper Feather River reservoirs can be found on Section V, page V-21. Monthly operations are presented on page V-1.

Lake Oroville

Lake Oroville's maximum storage was recorded at 3,407,512 ac-ft on June 11, 114,285 ac-ft short of its maximum normal operating storage. Minimum storage in Lake Oroville during the year occurred on January 1, 1,119,917 ac-ft. Actual filling of Lake Oroville was not realized in 1978 as the late season projected snowmelt, downstream releases were held at about twice normal levels through May 10 to avoid later extraordinary releases. Maximum computed bi-hourly inflow to Lake Oroville was 57,026 cfs on March 5. Lake Oroville storage is delineated on page V-21, and other various charts and tables of Oroville operations are presented on pages V-2 through V-4.

The surface water temperature in Lake Oroville reached a high of 82°F on August 10. Minimum temperature recorded was 48°F on January 5. Monthly Lake Oroville isotherms are delineated on page V-5.

Oroville Complex Releases

Releases to satisfy prior water rights to Sutter/Butte Canal, Pacific Gas and Electric Company Lateral, Western Canal, Richvale Canal, and Palermo Canal totaled 786,600 ac-ft, reaching a peak rate of 2,876 cfs on July 25. Releases to the Feather River totaled 2,53,182 ac-ft, with a peak rate of 16,455 cfs on March 9. Figure E, page 25, "Oroville Complex", shows monthly distribution of the releases from the Complex and the disposition of inflow to the Complex, including that from the Kelly Ridge Powerplant.

End-of-month water surface elevations and storage values are presented in page V-6 for Thermalito Diversion Pool, Forebay and Afterbay.

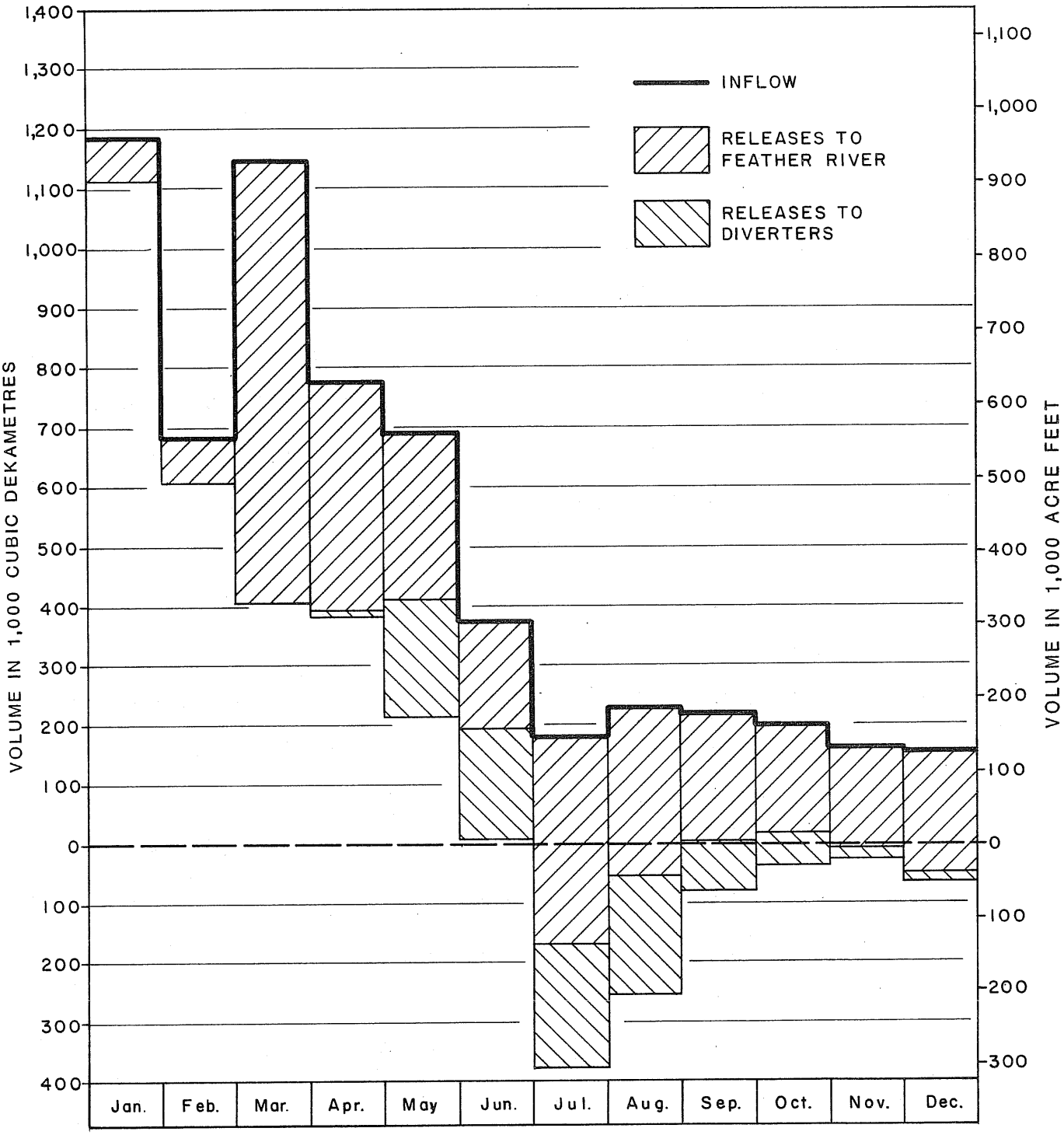
Miscellaneous Upstream Relèases

Ponderosa Dam releases into Lake Oroville from South Fork Feather River totaled 275,817 ac-ft. Lake Wilenor water released into Lake Oroville totaled 8,212 ac-ft. Thermalito Irrigation District deliveries totaled 1,121 ac-ft.

Hyatt-Thermalito Powerplants

Gross generation at the Hyatt-Thermalito (Oroville) Complex during the year totaled 2,041,100 megawatt hours. Energy consumed for the year's pump storage operation totaled 102,200 megawatt hours. A graph showing the Hyatt-Thermalito monthly distribution of gross generation is presented on page VI-3. Monthly operations are tabulated in Secotion VI, page VI-4.

Figure E
OROVILLE COMPLEX
OPERATIONS IN 1978
INFLOW AND RELEASES



Annual Inspection

The critique for the annual inspection of the Oroville Field Division was held May 12. Mr. Howard E. Eastin, Chief, Division of Operations and Maintenance, conducted the critique with Mr. Phil J. Johns, Chief, Oroville Field Division, representing the Field Division. Ms. Alexandra Fairless represented the California Water Commission.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations of the Oroville Field Division are presented in chronological order.

January 1 - 3, Edward Hyatt Powerplant Units 2, 4, and 6 (pump/generators) were on reserve shutdown status. Through December 1977, the units had been available only for emergency generation. This emergency restriction was due to the unstable hydraulic conditions experienced in these machines at lower heads.

January 1 - 9, Edward Hyatt Powerplant units were limited to block loading due to the low water surface level of Lake Oroville. On January 9, automatic dispatch control was resumed by PGandE, after having been discontinued since July 25, 1977.

January 1 - 14, Edward Hyatt Powerplant pump/generator Units 2, 4 and 6 were unavailable for pumping while Lake Oroville's water surface elevation was below 725 feet.

January 1 - April 7, Edward Hyatt Powerplant Trashrack modification work was being completed. This was the final work on the fabrication and installation of replacement trashracks and the installation of stabilizer assemblies initiated September 7, 1977.

January 1 - December 31, Edward Hyatt Powerplant Units 2, 4 and 6 were unavailable as synchronous condensers because of excessive air leakage through the shaft packing.

January 23 - February 27, Edward Hyatt Powerplant No. 1 Penstock was dewatered to replace upstream seat "O" rings for the turbine shut-off valve.

March 10, a scheduled outage was canceled on Edward Hyatt Powerplant Unit 2 and Penstock No. 2 to realize maximum generation from required high releases from Lake Oroville to maintain flood reservations.

April 13 - 23, Edward Hyatt Powerplant Unit 6 was forced out of service with a shorted rotor. The unit was returned to service after about one-third of the stator was rebuilt.

May 10 - 23, Edward Hyatt Powerplant Unit 2 was forced out of service and returned after one-half of the stator coil was replaced.

October 12 - 19, Edward Hyatt Powerplant Unit 5 was unavailable as a synchronous condenser due to a plugged seal water line.

Also, during the year, annual maintenance was performed on Hyatt Unit 3 (January 16 - February 27), Hyatt Unit 2 (March 28 - April 6), Thermalito Unit 4 (September 15 - October 3), Hyatt Unit 4 (October 10 - November 4), Thermalito Unit 3 (November 9 - 24), Thermalito Unit 2 (November 23 - December 12), and Thermalito Unit 1 (December 18 - 31). Other units of the Hyatt and Thermalito Plants were out of service for minor repairs or maintenance during the year, with outage periods ranging from less than one day to a week.

Delta Field Division

Water Deliveries

Water deliveries within the Delta Field Division, including local supplies, totaled 140,506 ac-ft for the year. This total is nine percent more than the 1977 water deliveries, which included drought emergency water delivered to San Francisco and Marin Counties. A comparison of the 1978 water deliveries to the three areas the district serves and their percent difference from 1977 deliveries are shown in the table below. Annual water deliveries to each contractor are summarized in Section I, page I-2.

Delta Field Division Water Deliveries

Area	Water Deliveries ac-ft	Difference from 1977 in percent
North San Joaquin Division	3,912	16
North Bay	6,034	-27
South Bay	130,560	1

Delta Pumping Plant

Pumping at the Delta Pumping Plant for the year totaled 2,210,785 ac-ft, the greatest yearly total since operation began in 1967, and 17 percent over that pumped during 1975, the previous high year. The Delta Pumping Plant pumped with all available units between January 1 and March 3. There was no pumping on March 7 and between March 9-14, following the filling of the SWP share of San Luis Reservoir. From April 10 to May 3, pumping was generally limited to meeting South Bay Aqueduct demands as wet weather conditions reduced San Joaquin Valley and Southern California water requirements.

Of the 1978 total pumping at the Delta Pumping Plant, 15,228 ac-ft were pumped for the USBR. All water pumped for the USBR was conveyed through the California Aqueduct to O'Neill Forebay. Of the total, 8,387 ac-ft were for delivery to federal Cross Valley Canal customers. Between June 12 and 14, a total of 6,295 ac-ft were pumped utilizing excess SWP capacity, while there was still excess water available in the Delta to maintain the USBR share of O'Neill Forebay storage, rather than start generating at the San Luis Plant. All pumping at the Delta Pumping Plant for the USBR was done during periods when it was providing its share of water to maintain the then existing water quality objectives in the Delta established by the SWRCB. Also, the USBR provided all power required for the pumping of its water at the Delta Pumping Plant.

South Bay Aqueduct

Pumping at the South Bay Aqueduct Pumping Plant totaled 103,616 ac-ft for the year, a reduction of 15 percent from 1977. With the high local runoff, pumping to fill Lake Del Valle was not required for the first time since 1974.

Lake Del Valle reached its maximum storage, 41,891 ac-ft on March 6. Releases from Lake Del Valle for flood control to the South Bay Aqueduct started February 8, and to Arroyo Valle January 17, and continued intermittently through April. Of the 21,871 ac-ft released for flood control, 8,531 ac-ft went to meet South Bay Aqueduct demands.

The annual drawdown of Lake Del Valle was between September 11 and November 13. Minimum storage was reached at year's end, 24,709 ac-ft.

Annual Inspection

The 1978 critique of the annual inspection of the Delta Field Division was held June 9. Mr. Howard H. Eastin, Chief, Division of Operations and Maintenance, conducted the critique with Mr. Charles F. Tarbox, Chief, Delta Field Division, representing the Field Division. Messrs. Thomas R. Beard and Ralph C. Graham represented the California Water Commission at this inspection.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations in the Delta Field Division in chronological order were:

February 6, Delta Pumping Plant Unit 2 was returned to service. This unit was taken out of service August 29, 1977, when its discharge valve failed to open. Subsequently the unit was disassembled and measured for the installation of a new stainless steel impeller.

February 8 - March 10, the South Bay Aqueduct was dewatered between Patterson check and Del Valle check for inspecting and sealing joints and cracks in the canal section, repairing a leak at Arroyo Seco Siphon, and inspecting the Arroyo Mocho Siphon. Deliveries below the dewatered section were met from Lake Del Valle releases.

February 9 - April 11, South Bay Pumping Plant Unit 3 was out of service to remove the discharge valve and correct leakage.

March 13 - April 14, Patterson Reservoir was dewatered for cleaning and repair of the asphaltic concrete lining.

March 17 - April 14, Delta Pumping Plant Unit 4 was out of service to replace the "O" rings on the spherical valve seats.

March 30 - May 11, the 4040 computer of the Delta Field Division's ACC was out of service for repairs to the drum. The effect on water deliveries was minimized during this period by resorting to manual operations.

April 14 - June 9, Delta Pumping Plant penstock No. 3 was out of service for repair of the protective coating on Units 6 and 7 discharge line manifold.

April 14 - June 15, Delta Pumping Plant Unit 6 was out of service for modification of the discharge valve hydraulic system and repair of impeller cavitation damage.

April 15 - 21, Delta Pumping Plant acoustical flowmeter readings were compared with volumetric flow measurements. During these measurements, there was no flow past the California Aqueduct Check 12.

April 28 - May 2, the South Bay Aqueduct was dewatered to Check 3 (Patterson Reservoir) to repair the canal lining. Deliveries below Patterson Reservoir were met from increased releases from Lake Del Valle.

May 1 - July 31, Project exports from the Sacramento-San Joaquin Delta were limited to a daily average of 3,000 cfs during May and June and 4,500 cfs during July. This limitation was in compliance with an interim agreement with the State Department of Fish and Game for the SWP to curtail exports from the Delta to the maximum degree practical each year during the peak of striped bass spawning. In 1978 the Department of Fish and Game requested the limitation in lieu of a five-week minimum pumping period which had been previously used.

May 4 - June 28, pumping at the Delta Pumping Plant was limited to meeting demands generally north of Buena Vista Lake (Check 24) to accommodate snowmelt runoff let into the California Aqueduct through the Kern River Intertie (see San Joaquin Field Division, page 39).

May 15 - June 21, the South Bay Aqueduct access road to the surge tanks was rebuilt.

August 25 - October 7, Delta Pumping Plant unit breaker operation was held to a minimum while all unit circuit breakers were reconditioned. Doble tests made on all arc circuit breakers, after a breaker failure on Delta Unit 7 on August 25, showed that they would be subject to failure during the opening operation due to moisture in the arc quenching mechanism.

September 11 - October 3, South Bay Pumping Plant Unit 4 was out of service to replace the pump shaft sleeve and rebuild the overspeed switch.

October 2 - November 15, Delta Pumping Plant exports were limited during an experiment where SWP exports were restricted in lieu of constructing the rock barrier at the head of Old River (see Sacramento-San Joaquin Delta Operations, page 18).

October 3 - December 31, Delta Pumping Plant Unit 1 was out of service for the installation of a new stainless steel impeller.

November 6 - December 31, South Bay Pumping Plant Unit 4 was out of service to repair a leaking discharge valve.

Other units of the Delta and South Bay Plants were out of service for minor repairs or maintenance during the year, with outage periods ranging from less than one day to a week.

San Luis Field Division

Water Deliveries

Federal water deliveries from the Joint Facilities during the year totaled 910,860 ac-ft, 178 percent above deliveries made during the drought year 1977. Of this total, 45 ac-ft were delivered to the Department of Parks and Recreation from San Luis Reservoir and O'Neill Forebay; 259 ac-ft was mitigation water delivered from O'Neill Forebay to the Department of Fish and Game; and 4 ac-ft was recreation water delivered to the Mendota Waterfowl Habitat area. An additional 377 ac-ft of State water was delivered to Parks and Recreation and Fish and Game. This year's deliveries also included 855 ac-ft of ground water pumped into the San Luis Canal and transported to areas of use, and 389 ac-ft of flood water pumped into the San Luis Canal and transported to areas of use.

Water deliveries from the Joint Facilities to federal customers were made from 143 turnouts (64 permanent and 79 temporary). Annual water deliveries to federal customers are summarized in Section I, page I-2.

Mitigation Water

SWP's share of mitigation water totaled 4,178 ac-ft. Most of this year's mitigation water was conveyed to the recipients (California Department of Fish and Game, Grassland Water District, and William Affonso) through the Delta-Mendota Canal, although the California Department of Fish and Game also took deliveries from the O'Neill Forebay. Conveying of mitigation water through USBR facilities provides an overall savings to both agencies. The SWP provided the USBR a total of 1,013,324 kWh of electrical energy for pumping the SWP share of the mitigation water at the USBR's Tracy and O'Neill Pumping Plants.

San Luis Reservoir

San Luis Reservoir storage reached its maximum of the year, 2,021,741 ac-ft, on May 8. Minimum storage recorded for the year, 563,209 ac-ft, occurred on January 1. During the summer drawdown, San Luis Reservor storage dropped to 1,563,209 ac-ft on August 29, of which 951,645 ac-ft was SWP water. A graph showing the yearly fluctuations of San Luis Reservoir storage is presented in Section V, page V-11.

To ensure San Luis Reservoir being full at the beginning of the 1978 irrigation season, the USBR proposed in February that since the SWP would be filling its share of San Luis Reservoir early, it use a portion of the federal share of storage in San Luis Reservoir. Accordingly, for this year's filling operation, the SWP's early pumping into San Luis Reservoir included an additional amount of water to compensate for the SWP's share of evaporation losses expected to occur during the remainder of the USBR's filling operation.

This year's pumping at the San Luis Pumping and Generation Plant totaled 2,018,498 ac-ft, establishing a new high for the amount pumped at the plant in a calendar year and exceeding the previous high by 80 percent. Water released to O'Neill Forebay totaled 478,819 ac-ft. On December 31, 1978, storage in the San Luis Reservoir totaled 1,926,052 ac-ft, of which 55 percent, 1,057,183 ac-ft, was SWP water. Monthly operation tables of O'Neill Forebay and San Luis Reservoir are presented in Section V.

The 1978 operation at the San Luis Pumping and Generation Plant includes the generation and pumping performed for PGandE pursuant to the 1978 agreement for the sale of San Luis generating

capacity. The agreement provided PGandE the use of the generation capacity at the San Luis Plant for a fee. Energy from the generation was to be replaced by either a pumpback operation (the water used for PGandE's generation pumped back later into San Luis Reservoir with PGandE providing the energy) or, at the SWP's discretion, an amount of energy equivalent to that which would have been used for the pumpback operation would be made available for SWP use. On the three occasions when PGandE called for SWP's San Luis capacity, May 19, June 5 and 6, and September 25, the pumpback operation was used.

Inflow of Flood Water

Releases from the Gale Avenue impoundment area into Pool 20 which began December 29, 1977, continued intermittently through April 24. Inflow of flood water into the San Luis Canal from all inlets and pumping totaled an estimated 38,369 ac-ft.

Annual Inspection

The annual inspection critique of the San Luis Field Division was held September 22. Mr. Howard H. Eastin, Chief, Division of Operations and Maintenance, conducted the critique with Mr. Jack Arnold, Field Division Chief, San Luis Field Division, representing the Field Division. Representatives from the USBR included Messrs. Dave Coleman, Chief of the Central Valley Operations Coordinating Office, and E. R. Klinke, Chief, Power O&M Branch.

Activities, Outages, and Limitations

Other activities, events, outages, and limitations affecting or influencing operations in the San Luis Field Division in chronological order were:

January 6, all units of the San Luis Pumping/Generation Plant operational mode were changed from 120 r/min to 150 r/min to compensate for the higher pumping head. This change increased the capacity and efficiency of the units.

June 12 - June 23, San Luis Unit 1 was out of service to repair a bypass valve.

August 18, deliveries from Pool 21 were halted and those below Pool 21 were curtailed after a crop dusting plane crashed in Pool 21. The plane carried a mixture of 4 gallons of Dibrom, 8 gallons of Kelthane, and 288 gallons of water. During the removal of the craft from the Aqueduct, about 200 gallons of the substance spilled into the pool. Although there was no health hazard, domestic water customers below Pool 20 were advised not to resume taking water until after the contaminated water had passed their turnout. The pilot of the crashed plane escaped without injury.

September 22 - October 13, San Luis Penstock No. 2 (Units 3 and 4) was out of service to install transducers for testing hydraulic surging.

December 7, a transient pressure test was performed on San Luis Penstock No. 2. Results indicated that the maximum transient pressures were not large enough to cause concern. The pressure instrumentation was left in place for monitoring transient pressures at other reservoir water surface elevations.

December 11 - December 21, Dos Amigos Pumping Plant Unit 1 was out of service to adjust guide clearance.

Also, during the year, annual maintenance was performed on Dos Amigos Unit 4 (January 20 - March 3), Dos Amigos Unit 2 (March 1 -May 2), Dos Amigos Unit 5 (October 6 - November 22), and San Luis Units 5 and 6 (November 9 - December 15). Other units of the San Luis and Dos Amigos Plants were out of service for minor repairs or maintenance during the year, with outage periods raning from less than one day to a week.

San Joaquin Field Division

Water Deliveries

Water delivered to State water service contractors in the San Joaquin Field Division during 1978 totaled 764,971 ac-ft, up 46 percent over 1977 drought year deliveries. Of this total, 8,623 ac-ft were extra surplus water.[5] In addition, 2,478 ac-ft of USBR water was wheeled from Check 21 to the Cross Valley Canal turnout for delivery to federal customers in the Arvin-Edison Water District to alleviate the emergency situation caused by the damage to the District's ground water pumping system during the December 1977 dust storm. An additional 5,909 ac-ft of federal water was wheeled to the Cross Valley Canal during July and August. The 1978 total federal water wheeled was down 73 percent from that wheeled in 1977.

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[5] Extra surplus water is water not required for Delta water quality requirements or SWP needs, and that can be delivered with SWP excess capacity for ground water replenishment or agricultural use.

Pre-consolidation repayment water delivered in 1978, totaled 2,430 ac-ft against none in 1977. At the end of 1978, the pre-consolidation repayment account to be delivered before 1985 was:

Contract No. and Holder	Total Contract Amount	1977 Balance	1978 Deliveries	Remaining Balance
No. 153431 J. G. Boswell Co.	131,600	85,375	480	84,895 ac-ft
No. 153697 Belridge Oil Co.	108,000	59,927	1,950	57,977 ac-ft

A table showing water deliveries by year and totals to date for individual State water service contractors is presented in Section I, page I-2.

In addition to regular deliveries, 91 ac-ft of ground water was conveyed through the California Aqueduct for the Wheeler Ridge-Maricopa Water Storage District during January.

The 1978 water deliveries to State water service contractors in the Division included water from the Kern River Intertie. Completed in 1976, the Intertie diverted potential flood water into the California Aqueduct between April 6 and June 28 to meet demands. In this first operation since completion, 177,931 ac-ft of Kern River water was diverted into the Aqueduct. Included in the water diverted through the Kern River Inertie was 9,112 ac-ft from the Friant-Kern Canal. Although the total diverted was less than originally anticipated, the diversion did allow the beneficial use of high Kern River flows, which would have otherwise flooded agricultural lands as in 1969 and 1971.

When the Kern River Intertie diversion began, SWP southern reservoirs had only limited storage space available and demands were low because of the abundance of local water, therefore, to insure the Intertie could take in the projected diversion, three arrangements were made to increase the SWP's capacity to manage the volume of water. In each arrangement, provisions included the repayment for all SWP costs as in in the operation of the Kern River Intertie itself.

The first of the arrangements involved an agreement with the Delta Lands Reclamation District No. 770 for the installation of pumps at Checks No. 23 and 25 to allow Kern River water to be pumped north, back up the California Aqueduct, to meet SWP demands. Although no water was pumped north of Check No. 23, 17,967 ac-ft was pumped north at Check No. 25.

The second arrangement provided for the Metropolitan Water District of Southern California (MWD) to take additional SWP water, in lieu of an equivalent amount of Colorado River water. Although the water delivered was SWP water after it entered the California Aqueduct from the Kern River Intertie, the agreement specifically provided that this additional water delivered to MWD was not entitlement water. The price MWD paid the SWP for this additional water equaled MWD's unit power costs for importing Colorado River water, $4.67 per acre-foot. A second agreement with the Delta Lands Reclamation District No. 770, provided for the District to pay the SWP its estimated power costs to delivere the water to MWD less the $4.67 per acre-foot paid by MWD, plus a $.50 per acre-foot service charge. Water delivered to MWD under this arrangement totaled 42,596 ac-ft.

The third arrangement provided for the recharging of the Mojave Ground Water Basin. Under this initial ground water recharge demonstration project with the Mojave Water Agency, the SWP released 23,684 ac-ft from Cedar Springs Dam, in the Southern Field Division, to the Mojave River between May 9 and June 18. The agency will have this water for use through 1982, in lieu of receiving delivery of SWP water conveyed by surface water facilities.

Annual Inspection

The annual inspection critique of the San Joaquin Field Division was held October 20. Mr. Howard H. Eastin, Chief, Division of Operations and Maintenance, conducted the critique with Mr. Merle Bashor, Chief, San Joaquin Field Division, representing the Field Division. Mr. Ralph E. Graham represented the California Water Commission.

Activities, Outages, and Limitations

Through a series of abnormal climatic events, the Division was beset with a number of extraordinary maintenance and repair problems lasting well into the year. First, high winds in December 1977 left the District with an extensive cleanup job which even required clearing dust from inside electrical boxes in buildings. Then came the rains, the heaviest of record in the southern San Joaquin Valley. They brought heavy flows of alluvial silt and debris against the uphill retaining embankments of the Aqueduct, causing settlement, erosion in some areas, and embankment breaks at mile 255.25 and 260.45. Besides the damage sustained at the various installations, repairs were hampered by the damage to the primary and secondary Aqueduct access roads. Water, silt, and rock which flowed from the Coast Range Mountains down Avenal Gap overflowed

into Las Perillas Pumping Plant, filled the Forebay and Pool No. 1 with silt, washed out concrete aqueduct lining, and caused other damage. Later in the year, south winds blew three or four times the normal tumbleweed volume into the Aqueduct. To keep the Division operational, the field and plant personnel worked days, nights, and weekends with extraordinary help from support personnel. While the Division was available for normal operations by August, repair work continued into 1980.

In April, the Semi-Tropic turnout control system failed, increasing diversion from 50 cfs to 490 cfs. Before the flow could be reduced manually, approximately 15 acres of planted land was flooded and there was some damage to Semi-Tropic's canal.

Other activities, events, outages, and limitations affecting or influencing operations in the San Joaquin Field Division in chronological order were:

January 1 - March 31, A. D. Edmonston Pumping Plant Unit 4 was out of service for coil and bearing work. This unit was originally taken out of service November 7, 1977, to tighten stator wedges and repair impeller and standstill seals.

January 1 - October 12, A. D. Edmonston Pumping Plant Unit 2 was out of service to disassemble and repair cavitation damage to the first stage impeller. Unit 2 was initially taken out of service April 4, 1977.

February 10 - March 20, Las Perillas Pumping Plant was out of service to remove debris from flood flows in the forebay and downstream canal section, and to replace washed out concrete lining sections of the Aqueduct. Although the road to the plant was destroyed by the flood waters, there was no structural damage to the plant itself.

February 28 - July 25, A. D. Edmonston Pumping Plant Unit 9 was out of service to repair a standstill seal, replace the lower labyrinth ring, and rewedge the stator.

April 24 - May 5, A. D. Edmonston Pumping Plant Unit 7 was out of service to replace an upper standstill shaft seal.

May 5 - June 12, at California Aqueduct Check 23 and 25 pumps were installed by Delta Lands Reclamation District to pump Kern River water north.

May 9 - 18, A. D. Edmonston Pumping Plant Unit 6 was out of service to repair a thrust bearing and an upper guide bearing oil leak.

May 26 - 27, Kern River Intertie gates were closed and Kern River water spilled into Tulare Basin area due to an oil spill into the Kern River from a broken pipeline. Four absorbent booms were placed in the Aqueduct, and one was placed between the Kern River Intertie trashracks and gates. Limited diversions were resumed after operators were stationed at the Intertie to assure all oil was bypassed to the overflow north. Oil removed from the Aqueduct and river was cleaned up by the oil company and SWP personnel.

July 3 - August 21, Wind Gap Pumping Plant Unit 5 was out of service to repair a backfill check valve.

July 10 - December 31, A. D. Edmonston Pumping Plant Unit 1 was out of service to disassemble and repair a frozen labyrinth ring.

August 4, California Aqueduct was closed between Checks 21 and 22 when a crop dusting plane made an emergency crash landing

on the secondary road of the California Aqueduct near Utica Avenue. Although the pilot was slightly injured, none of the toxic phosphates the plane was carrying escaped into the Aqueduct.

August 8 - 18, Wheeler Ridge Pumping Plant Unit 2 was out of service to repair brakes.

August 9 - 29, Wind Gap Pumping Plant Unit 4 was out of service to repair a check valve.

August 31 - December 8, Buena Vista Pumping Plant Unit 10 was out of service to remove the rotor for cleaning, and to repair the grounded motor field.

September 9 - December 31, Wind Gap Pumping Plant Unit 1 was out of service to disassemble the motor and clean the stator and to install a new ball valve in the backfill bypass system.

September 13 - 21, Las Perillas Pumping Plant Unit 3 was out of service to modify the emergency trip circuits.

September 11 - 28, A. D. Edmonston Pumping Plant on-peak operations were limited due to Southern California Edison Company's repair and renovation of towers on the Pastoria-Edmonston transmission line.

November 22 - December 31, Wind Gap Pumping Plant Unit 7 was out of service to repair a bypass check valve.

Also, during the year, annual maintenance was performed on Wheeler Ridge Unit 4 (March 14 - May 31), Buena Vista Unit 1 (April 3 - May 5), Wheeler Ridge Unit 2 (April 10 - September 3), Buena Vista Unit 2 (May 8 - June 9), Wheeler Ridge Unit 3 (September 11 - December 31), Las Perillas Unit 5 (October 30 - November 6), and

Las Perillas Unit 6 (November 13 - 22). Other units of the A. D. Edmonston, Wheeler Ridge, Buena Vista, Wind Gap, and Las Perillas Plants were out of service for minor repairs or maintenance during the year, with outage periods ranging from less than one day to a week.

New Turnout Construction Completions

Berenda Mesa No. 2, Kern County Water Agency, M.P. 196.4

Bellridge No. 1A, Kern County Water Agency, M.P. 209.71

Buena Vista No. 6, Kern County Water Agency

Turnout control assemblies were installed at 24 turnouts. These assemblies provide remote monitoring and control flow through the turnouts.

Southern Field Division

The storm systems which so dramatically ended the 1976-1977 drought in Northern California also carried over into Southern California and affected operations in the Southern Field Division. With the availability of water in the Delta during the latter part of December 1977, the Southern Field Division's pumping and generating plants were approaching normal operations by early 1978.

The return of normal operations permitted the SWP to resume pumping water over the Tehachapis for delivery to the Metropolitan Water District of Southern California (MWD). Pumping to make water deliveries to MWD had been halted effective March 1, 1977, due to the drought conditions in Northern California. Also, with SWP operations returning to normal, an exchange agreement with MWD that had been entered into late in 1977 was discontinued. It was similar

to the one entered into with MWD in early 1977, by which MWD released SWP water for delivery in Northern California in exchange for energy to pump a like amount of Colorado River water to use in Southern Califoria. The discontinued exchange agreement provided for MWD to release 200,000 ac-ft of SWP water in 1978. Before it became apparent that the exchange water would not be needed for drought relief in Northern California in 1978, energy had been provided MWD to pump 30,000 ac-ft of Colorado River exchange water. The disposition of this Colorado River exchange water for which the SWP had incurred pumping costs but had no commitments for were resolved by:

- The Kern County Water Agency (KCWA) and Dudley Ridge Water District (DRWD) agreeing to purchase 25,000 ac-ft and 5,000 ac-ft respectively, and to take delivery before March 31, 1983.
- MWD agreeing to store the water within its service area where it would be substituted for SWP entitlement deliveries to MWD as KCWA and DRWD request delivery of their purchased exchange water.

With the availability of water and storage space in SWP reservoirs, SWP inflow into the Southern Field Division (pumping at the A. D. Edmonston Pumping Plant) established a new high, 841,417 ac-ft, during 1978. This pumping, along with local runoff retained in East Branch reservoirs, also resulted in a new record for the total end-of-the-year storage in SWP reservoirs of the Southern Field Division (see following reservoir storage table). In addition to the SWP's reservoir storage, two ground water demonstration programs were established to store SWP water in local ground water basins. One of these demonstration programs, with the Mojave Water Agency storing 23,684 ac-ft, is described under the San Joaquin

Field Division, page 40. The other demonstration program was with the San Bernardino Valley Municipal Water District (SBVMWD) whereby up to 50,000 ac-ft is to be stored in SBVMWD's Bunker Hill ground water basin on the south side of the San Bernardino Mountains. As needed for SWP operations, SBVMWD will be directed to pump the stored water instead of taking delivery of an equal amount of surface-delivered water. Recovery of all stored ground water for the demonstration is to be completed within 15 years. In 1978, 9,246 ac-ft was delivered to SBVMWD for storage in the Bunker Hill basin.

Included in this year's filling of Castaic and Pyramid Lakes was 134,498 ac-ft of local inflow. A temporary permit was obtained to store local flood flows in Castaic and Pyramid Lakes during periods when releases at rates comparable to inflow rates would have resulted in: (1) ocean discharge and (2) some damage due to high flows between the lakes and the ocean.

A summary of operations for the reservoirs in the following tabulation is presented in Section V.

Reservoir Storages
ac-ft

Reservoir Capacity [1]	Beginning Dec. 31, 1977	Ending Dec. 31, 1978	Maximum Date	Maximum	Minimum Date	Minimum
Pyramid Lake 169,902	167,767	160,834	3/11	169,772	3/5	151,605
Elderberry Forebay 28,231	22,580	17,262	5/12	32,757	3/3	9,853
Combination Pyramid Lake & Elderberry Forebay [2] 188,133	190,347	178,096	4/19	197,165	3/2	174,642
Castaic Lake 319,250	51,041	294,154	4/26	320,359	1/3	50,840
Silverwood Lake 73,031	42,490	71,263	2/12	73,513 [3]	1/1	44,128
Lake Perris 126,841	79,222	106,482	5/10	120,147 [3]	9/21	68,200

1. Maximum operating storage.
2 Provides for 10,000 ac-ft of storage space for Los Angeles Department of Water and Power's pumpback operation.
3 New record.

Water Deliveries

Water deliveries from the SWP to State water service contractors in the Southern Field Division totaled 633,509 ac-ft, up 144 percent over deliveries made during the drought in 1977. Not included in this total is the SWP water applied to the two ground water demonstration areas.

Recreation Water

Recreation water delivered in the Division in 1978 consisted of the following:

Agency	Amount ac-ft
U. S. Forest Service	17
Department of Parks and Recreation	481
L. A. County Recreation Department	176
Total	674

A table showing water deliveries by year and totals to date for individual State water service contractors is presented in Section I, page I-2.

Local Inflow

Release of local inflow, including flood flows, from SWP facilities in the Southern Field Division to satisfy water rights totaled 191,826 ac-ft, a new record high. End of the year storage of local inflow in the SWP's southern reservoirs was in the negative by 731 ac-ft, resulting from an over-projection of local runoff and an objective to vacate as much local water as possible before the end of the year.

Annual Inspection

The critique of the 1978 annual inspection of the Southern Field Division was held November 17. Mr. Howard H. Eastin, Chief, Division of Operations and Maintenance, conducted the critique, and Mr. Forrest D. Neff,[6] Chief, Southern Field Division, represented the Field Division. Dr. Merrill Goodall represented the California Water Commission.

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[6] Mr. Neff was appointed Chief of the Southern Field Division January 9, succeeding Mr. Joe Sherrard. Formerly operations Superintendent, San Joaquin Field Division, Mr. Neff has been with the Department since 1967.

Activities, Outages and Limitations

During 1978, SWP operations in the Southern Field Division were significantly influenced by the construction underway for expansion of facilities in the Division. In addition, runoff from the heavy rains during the first part of the year caused damage which required emergency reconstruction. The following itemize this year's major emergency reconstruction, expansion construction, and retrofit activities underway in the Southern Field Division.

Emergency Work

East Branch

- California Aqueduct mile 371 near Largo Vista Road Bridge, removal of 30,000 cubic yards of mud from flood flows.[7]

West Branch

- Oso Intake Canal emergency repairs.[8]
- Oso Canal interceptor drain and Quail Lake outlet dewatering system.[8]
- Upper Quail Canal lining failure repair and underdrain system installation.[8]
- Upper Quail Canal storm damage repairs.[8]
- West Branch between Quail Canal chute and Highway I-5, removal of debris and repair channel erosion from storm flows.[7]

Expansion Construction

West Branch

- Quail Lake enlargement and outlet structure.[8]
- Peace Valley Pipeline.[8]
- Pyramid Powerplant site development and structure.[8]

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[7] Completed during the year.

[8] In progress at year's end.

- Pyramid Powerplant vertical impulse turbines.[9]
- Pyramid Powerplant bridge crane.[9]
- Pyramid Powerplant penstock.[9]
- Pyramid Powerplant shutoff plug valves.[9]

Retrofit Activities

East Branch

- Perris Dam Spillway modification.[10]
- Devil Canyon Powerplant concrete deck seal, wall caulking, and flashing.[9]

West Branch

- Oso Plant maintenance shop.[10]
- Machining of existing stem flange bolts at Castaic low intake gate.[10]
- Pyramid Dam spillway modification.[9]
- Pyramid Dam miscellaneous modifications.[9]
- Angeles Tunnel intake works gate stem flange bolts.[9]
- Castaic Dam miscellaneous modificatins.[9]

Other activities, events, outages, and limitations affecting or influencing operations of the Southern Field Division in chronological order were:

January 1 - March 29, Oso Pumping Plant Units 3, 4, 5, and 6 were out of service to repair an oil leak in Unit 3, and to replace "O" rings in the discharge line couplings. The units were originally taken out of service September 21, 1977, to repair discharge valves.

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[9] In progress at year's end.

[10] Completed during the year.

January 1 - April 5, Cottonwood chute maximum flow was restricted to 1,325 cfs until February 1, when the restriction was raised to 1,350 cfs. Design capacity is 1,637 cfs.

January 1 - May 1, Lake Perris maximum water surface was restricted up to various elevations to investigate for sink holes:

to February 20,	1,578.14 ft
to March 1,	1,577.3 ft
to May 1,	1,582.74 ft

January 4 - March 15, Quail Lake water surface elevation was limited to below 3,300.7 ft during work on the 108-inch valve.

January 9 - 15, Gorman Creek Improvement Canal was out of service for lining repair. This work was prolonged due to weather conditions.

January 16 - 18, releases to Piru Creek from Pyramid Dam were stopped due to a washout of a pipeline for a potable water supply near Piru Lake.

February 22 - March 15, Pearblossom Pumping Plant discharge line No. 2 was out of service (Units 4, 5, and 6) to replace unit discharge valves, automatic bypass valves, and upstream and downstream stop valves.

March 5 - 6, Gorman Creek Improvment Canal was out of service for debris removal.

March 6 - 12, Castaic Pumping/Generating Plant was out of service because of a storm-damaged transmission line.

March 14 - 22, Pearblossom Pumping Plant discharge line No 1 was out of service (Units 1, 2, and 3) to replace the hot water bypass valve on Unit 3.

March 15 - 22, Upper Quail Canal maximum water surface elevation was restricted to 3,326.00 ft.

March 31 - April 15, Water deliveries down the West Branch were discontinued because of a high local runoff and limited storage space available in West Branch reservoirs.

April 16 - May 15, Upper Quail Canal was out of service to repair the canal lining about 150 feet upstream of the Quail Lake intake gates.

April 21 - June 14, Tehachapi Afterbay minimum water surface was held above 3,098.40 ft due to high ground water.

April 22 - May 9, Pyramid Dam facilities were on emergency power due to slides along the transmission line.

May 12 - 26, Lower Quail Canal water surface elevation was held near 3,298 ft due to high ground water.

June 29 - July 7, Oso Pumping Plant Unit 3 was out of service to repair a leak in the motor guide bearing.

July 15 - 22, Santa Ana Pipeline was out of service to test the blowoff valve.

August 1 - 4, Gorman Creek Improement Canal was out of service to repair the concrete lining upstream of Hungry Valley Siphon.

August 2 - 25, Upper Quail Canal was dewatered and Quail Lake water surface lowered for canal lining repairs.

August 21 - September 13, Oso Pumping Plant approach canal was out of service to repair 19 damaged panels.

August 22 - 31, Oso Pumping Plant Unit 7 was out of service to repair leaks in the discharge line.

September 11 - 28, SWP water was delivered to Southern Field Difision only during off-peak hours while Southern California Edison Company repaired and renovated towers of the Pastoria-Edmonston transmission line (see San Joaquin Field Division).

September 28 - October 20, Lake Perris water surface elevation was held at about 1,560 ft while shoreline recreation facilities were modified to accommodate seasonal lowering of the water surface. This resulted in some reduction in Lake Silverwood storage.

November 16 - 18, Gorman Creek Improvement Canal was dewatered to inspect and repair cracks in the canal lining.

November 20 - December 8, Pearblossom Pumping Plant Unit 5 was declared unavailable during on-peak periods except for an emergency, to allow for the assembly of Unit 6.

December 19 - 21, Mojave Siphon was dewatered to clear the screen on Las Flores Turnout.

December 21 - 31, Pearblossom Pumping Plant Unit 2 was out of service to repair the coil in the control circuit.

December 28 - 31, Gorman Creek Improvement was out of service to allow constructin of a retaining wall at the I-5 crossing.

Also, during the year, annual maintenance was performed on Oso Unit 3 (March 22-27), Devil Canyon Powerplant Unit 1 (April 3 - May 5), Pearblossom Unit 5 (April 10 - 26), Pearblossom Unit 6 (June 10 - December 19,), Oso Unit 8 (July 15 - 31), Pearblossom Unit 3 (October 30 - November 17), and Pearblossom Unit 4 (December 17 - 31). Other units of the Pearblossom, Castaic, Devil Canyon,

and Oso plants were out of service for minor repairs or maintenance during the year, with outage periods ranging from less than one day to a week.

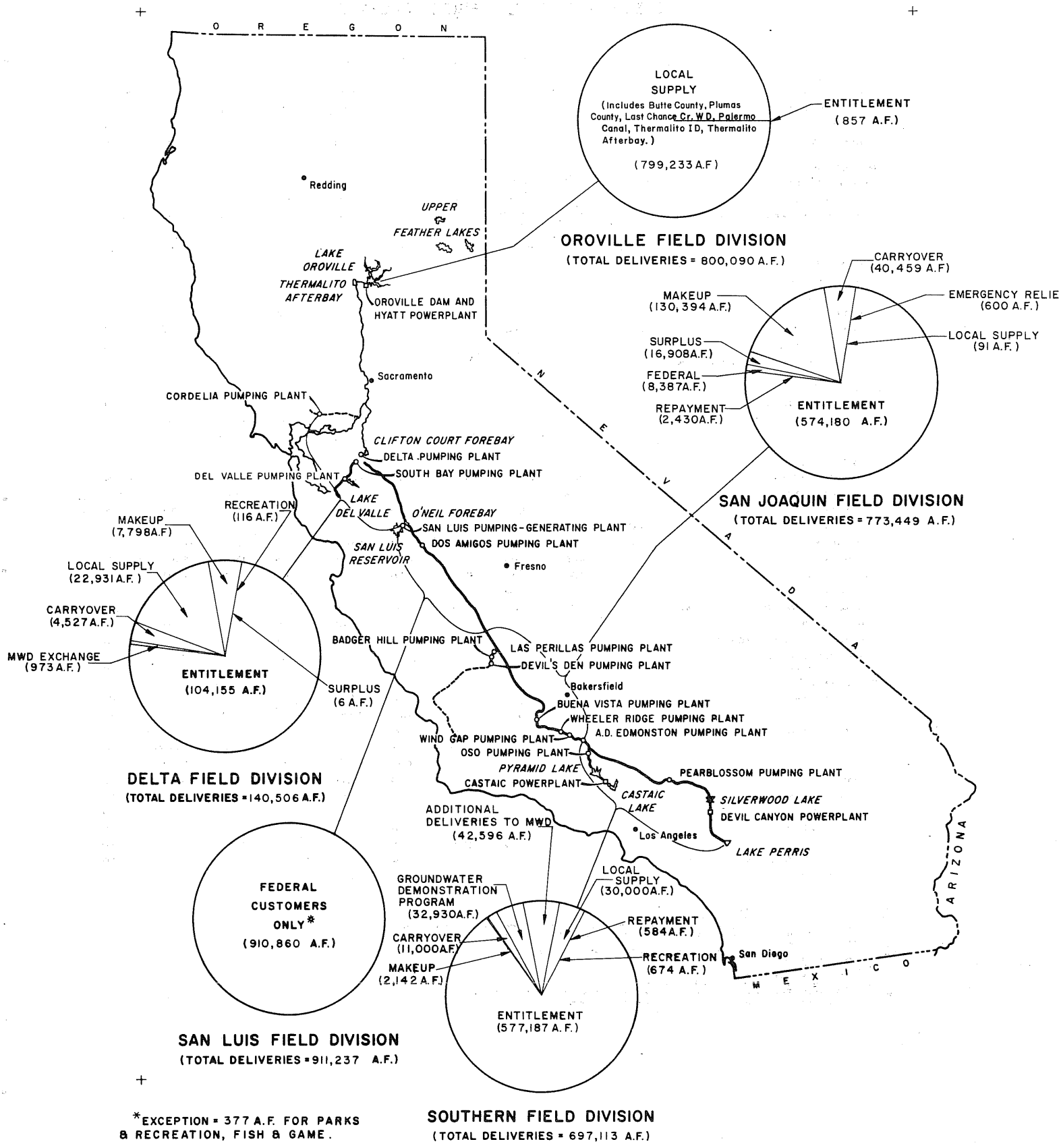
Telemetering

Installation of telemetering equipment was completed for all but one of the streamflow gaging stations measuring local inflow into Castaic Lake.

Provisions were completed for remotely controlling the Pyramid Dam stream release valves.

PROJECT DELIVERIES

PROJECT WATER DELIVERIES
1978



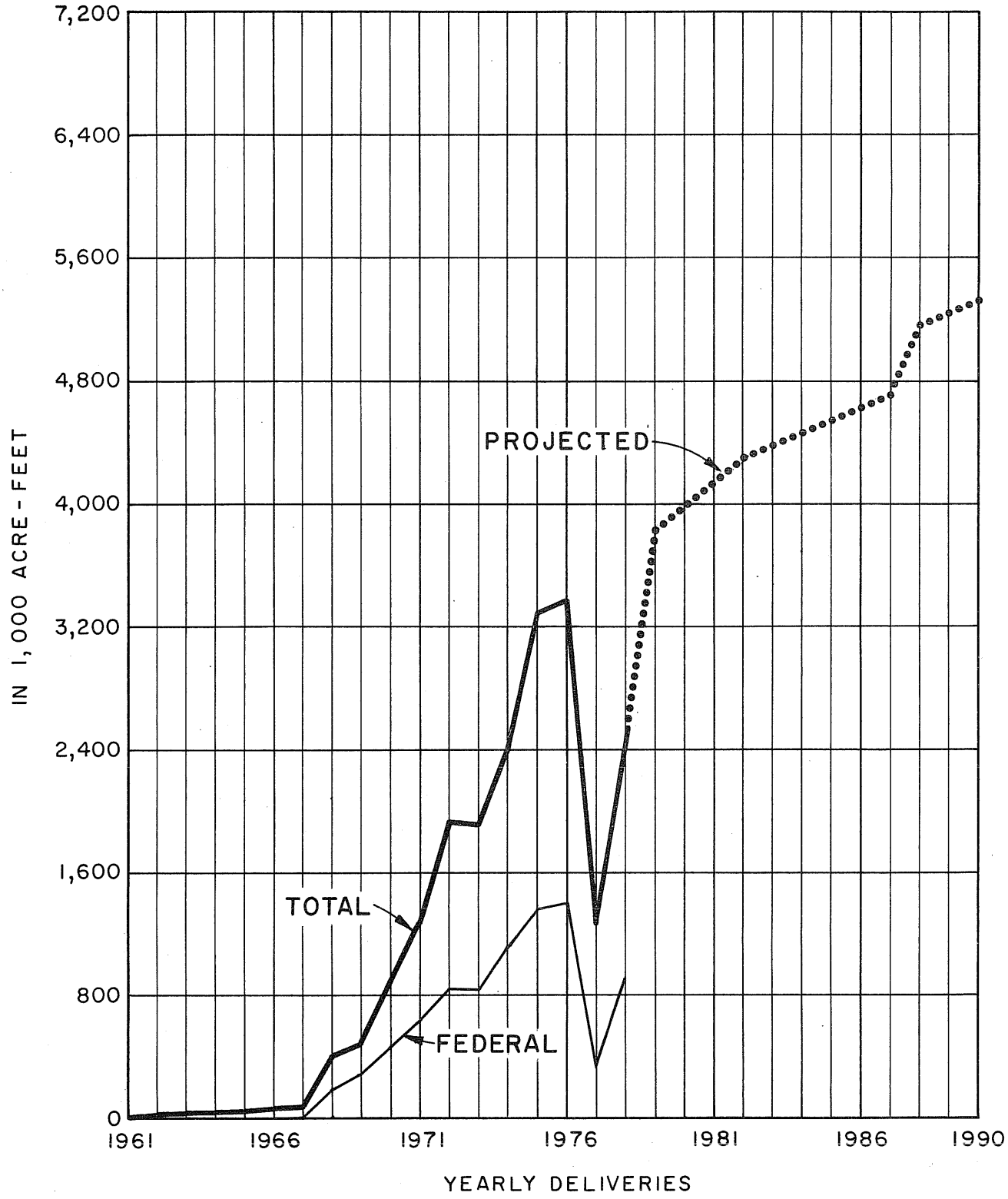
*EXCEPTION = 377 A.F. FOR PARKS & RECREATION, FISH & GAME.

PROJECT WATER DELIVERIES 1962-1978

AGENCY	1962-1970	1971	1972	1973	1974	1975	1976	1977[6]	1978	TOTAL
OROVILLE FIELD DIVISION										
Last Chance Creek W.D.	99,819	10,119	14,432	12,971	16,090	18,602	11,437	6,372	11,512	201,354
Plumas County F.C. & W.C.D.	70	64	505	679	648	405	382	303	278	3,334
County of Butte		192	186	53	127	253	527	706	579	2,623
Thermalito I.D.					393	413	234	418	1,121	2,579
DELTA FIELD DIVISION										
Napa County F.C. & W.C.D.	7,519	2,521	3,647	3,792	4,870	6,840	7,122	8,226	6,034	54,472
Alameda County W.D.[1]	134,959	11,652	27,786	7,900	1,433	8,725	26,643	20,644	14,963	254,685
Alameda County F.C. & W.C.D., Zone 7[1]	38,811	14,777	14,141	13,041	14,416	16,320	20,983	12,940	18,781	164,210
Pleasanton Township W.D.		674								674
Santa Clara Valley W.D.	301,333	87,606	100,266	91,081	90,934	106,470	112,705	76,220	95,727	1,062,342
Marin M.W.D.[7]								4,594	0	4,594
San Francisco W.D.[7]								3,372	973	4,345
Skylonda M.W.D.[7]								10	0	10
Oak Flat W.D.	12,011	7,212	8,166	4,227	6,942	7,152	7,952	3,370	3,912	7,642
Mustang W.D.	1,176	1,438	1,642						0	4,256
Tracy Golf & Country Club					11				0	11
East Bay Regional Park District (Lake Del Valle)							141	112	116	369
SAN LUIS FIELD DIVISION										
Dept. of Parks and Recreation (State's share)			15	15	10	19	23	61	54	197
Dept. of Fish and Game (State's share)							72	298	323	693
Federal Customers	946,205	633,269	846,687	845,774	1,121,747	1,361,573	1,337,137	323,638[2]	910,860	8,326,890
SAN JOAQUIN FIELD DIVISION										
Tulare Lake Basin W.S.D.	32,181	115,826	252,542	111,552	137,978	214,706	112,717	44,522	9,533	1,031,557
Empire West Side I.D.	5,976	5,990	5,795	5,814	4,539	6,448	6,457	2,355	454	43,828
County of Kings	1,000	3,700	1,400	1,500	1,500	1,600	1,600	1,530	2,070	15,900
Hacienda W.D.	12,420	6,659	5,851	8,500	5,272	7,517	7,620	3,836	2,520	60,195
Kern County W.A.	473,283	360,151	490,781	505,243	646,433	821,640	881,400	432,837	675,970	5,287,738
Dudley Ridge W.D.	98,142	41,053	42,443	35,249	66,781	81,110	72,343[3]	28,918[2]	59,333	525,372
Devil's Den W.D.	29,091	12,490	13,905	13,522	13,828	18,195	17,427	11,911	11,362	141,731
J. G. Boswell Company[8]		7,113	25,542	4,358	2,500	0	6,712	0	480	46,705
Belridge Oil Co. (formerly Buena Vista W.S.D.)[8]		8,241	19,250	5,945	7,840	6,797	0	0	1,950	50,023
Green Valley W.D.					1,741	2,217	0	0	1,299	5,257
Federal, USBR (U.S. Fish & Wildlife Service)						11,700	0	0	0	11,700
Federal, USBR (Cross Valley Canal)							88,300	31,060	8,387	127,747
Wheeler Ridge W.S.D.									91	91
SOUTHERN FIELD DIVISION										
Antelope Valley-East Kern W.A.			53	20	1,259	8,068	27,782	33,354	44,137	114,673
Metropolitan W.D. of So. California			71,938	159,883	277,715	526,958	618,541[4]	189,755	550,161	2,394,951
Littlerock Creek I.D.			338	370	467	876	589	111	208	2,959
Mojave W.A.			55	0	14	0	0	80	24,268[10]	24,417
Desert W.A.				9,000	10,000	11,000	12,000	0	15,300	57,300
Coachella Valley County W.D.				5,800	6,400	7,000	7,600	0	10,084	36,884
Crestline-Lake Arrowhead W.A.			464	461	627	825	1,002	1,109	1,209	5,697
San Gorgonio Pass W.A.										0
San Gabriel Valley M.W.D.					612	5,450	6,071	8,996	7,771	28,900
San Bernardino Valley M.W.D.			1,275	32,426	16,605	13,865	12,273	24,833	13,301[11]	114,578
Parks & Recreation (Federal, State & County)					44	70	613	937[5]	674	2,338
Piru Creek Fish Enhancement					1,362	1,553	0	0	0	2,915

* Does not include Thermalito Afterbay deliveries of prior water right entitlements.
1/ Includes regulated delivery of local supply.
2/ Includes 245 acre-feet for State Department of Fish and Game and 49 acre-feet to State Department of Parks and Recreation.
3/ Of this amount, 10,500 acre-feet was acquired by exchange agreement with Metropolitan W.D.S.C.
4/ Does not include amount shown in footnote 3.
5/ Includes: Reach 24, 111 acre-feet; Reach 28J, 469 acre-feet; and Reach 30, 357 acre-feet.
6/ Includes Exchange and 1976 Carryover Water.
7/ Exchange water only.
8/ Repayment of preconsolidation water.
9/ Includes 200 acre-feet of local supply from Kaweah River.
10/ Includes Groundwater Demonstration Program and 584 acre-feet for water borrowed during construction.
11/ Includes Groundwater Demonstration Program and 4,055 acre-feet of entitlement water.

PROJECT WATER DELIVERIES - YEARLY TOTALS



Excludes Thermalito Afterbay and includes Federal deliveries

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

SECTION II

(Amounts in Acre-feet)

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

Description	January	February	March	April	May	June
DELTA FIELD DIVISION						
North Bay Aqueduct						
Pumped at Cordelia Pumping Plant	345	283	370	323	741	556
Storage Change	-2	-10	3	-1	3	5
Operational Losses (-), Gains (+)	0	-2	0	0	0	0
Delivered to Contracting Agency	347	291	367	324	738	551
California Aqueduct						
Pumped at Delta Pumping Plant	365,379	343,310	107,705	34,632	58,550	200,819
South Bay Diversions (So. Bay P.P.)	3,112	255	3,836	5,045	10,966	13,436
Storage Change	-4,939	-251	94	-137	248	-317
Operational Losses (-), Gains (+)	-206	-164	-1,548	-968	-3,858	-5,074
Delivered to Contracting Agencies	0	0	0	0	794	794
Outflow at Check 12	367,000	343,142	102,227	28,756	42,684	181,832
South Bay Aqueduct						
Pumped at South Bay P.P.	3,112	255	3,836	5,045	10,966	13,436
Inflow from Lake Del Valle	3,467	4,707	3,475	2,005	425	0
Outflow at Del Valle P.P.	0	0	0	0	0	0
Operational Losses (-), Gains (+)	-10	-10	-10	-10	-20	-10
Delivered to Contracting Agencies: Project Water	4,100	3,924	5,991	5,479	9,408	11,252
Del Valle Inflow Exchange and Released from Aqueduct	1,496	469	646	673	434	0
Del Valle Inflow Released from Aqueduct	0	559	664	888	0	0
Delivered to San Francisco W.D.	973	0	0	0	0	0
Storage Change	0	0	0	0	0	0
Del Valle Stored Exchange and Released from Aqueduct	0	0	0	0	1,529	2,174
Lake Del Valle Operation: End of Month Storage	36,903	38,596	39,927	39,828	39,483	39,076
Storage Change	10,025	1,693	1,331	-99	-345	-407
SAN LUIS FIELD DIVISION						
O'Neill Forebay Operation						
End of Month Storage	49,450	45,289	49,609	45,863	39,324	41,557
Storage Change	-5,197	-4,161	4,320	-3,746	-6,539	2,233
Inflow, California Aqueduct	367,000	343,142	102,227	28,756	42,684	181,832
Inflow, O'Neill P-G Plant	237,521	221,691	247,112	158,556	72,682	142,891
Inflow, San Luis P-G Plant	0	0	0	42	1,381	31,566
Delivered to Federal Customers	21	22	210	74	2,660	3,319
Outflow, O'Neill P-G Plant	0	0	0	0	0	0
Outflow, San Luis P-G Plant	579,360	539,387	289,492	144,776	10,085	7,480
Operational Losses (-), Gains (+)	+25,472	+33,924	+33,700	+1,084	+2,681	+2,019
Outflow, Dos Amigos P.P.	55,809	63,509	89,017	47,334	113,222	345,276
San Luis Reservoir Operation						
End of Month Storage	1,108,497	1,617,913	1,879,432	2,015,903	2,018,441	1,987,818
Storage Change	545,288	509,416	261,519	136,471	2,538	-30,623
Inflow, San Luis P-G Plant	579,360	539,387	289,492	144,776	10,085	7,480
Operational Losses (-), Gains (+)	-34,072	-29,971	-27,973	-8,263	-6,166	-6,537
Outflow, San Luis P-G Plant	0	0	0	42	1,381	31,566
California Aqueduct (Pools 14 thru 21)						
Inflow, Dos Amigos P.P. (State)	54,726	61,015	57,857	18,774	46,994	183,225
Inflow, Dos Amigos P.P. (Federal)	1,083	2,494	31,160	28,560	66,228	162,051
Inflow, Floodwater into Aqueduct	6,589	23,392	7,888	500	0	0
Inflow, Well Water Pumped into Aqueduct	352	332	266	0	0	0
Storage Change	-1,827	-377	832	49	870	-459
Delivered to Federal Customers	976	9,838	31,926	27,152	65,247	162,446
Delivered, Well Water	6	0	0	142	707	0
Delivered, 1977 Mendota Pool Carryover 1/	206	135	147	175	434	566
Losses, Well Water (-) 2/	-35	-33	-27	0	0	0
Operational Losses (-), Gains (+)	-3,713	-5,206	-6,612	-4,011	-5,688	-3,400
Outflow, Check 21 (State)	58,120	71,782	57,774	16,480	40,710	179,889
Outflow, Check 21 (Federal)	1,727	751	0	0	0	0

1/ 2,652 acre-feet carried over from 1977 pumping from Mendota Pool by Westlands W.D.
2/ By agreement, well water pumped into Aqueduct was reduced 10% to account for losses.

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

(Amounts in Acre-feet)

July	August	September	October	November	December	Total	Description
							DELTA FIELD DIVISION
							North Bay Aqueduct
384	590	602	649	652	553	6,048	Pumped at Cordelia Pumping Plant
-2	0	-2	-6	7	-1	-6	Storage Change
0	0	0	0	0	-20	-22	Operational Losses (-), Gains (+)
386	590	604	655	645	534	6,032	Delivered to Contracting Agency
							California Aqueduct
212,076	246,835	210,609	126,882	135,156	168,832	2,210,785	Pumped at Delta Pumping Plant
16,349	15,467	8,761	6,789	8,781	10,819	103,616	South Bay Diversions (So. Bay P.P.)
411	247	1,855	-2,236	-192	192	-5,025	Storage Change
-5,681	-4,195	-3,259	-859	-676	-2,431	-28,919	Operational Losses (-), Gains (+)
1,122	874	169	97	56	0	3,906	Delivered to Contracting Agencies
188,513	226,052	196,565	121,373	125,835	155,390	2,079,369	Outflow at Check 12
							South Bay Aqueduct
16,349	15,467	8,761	6,789	8,781	10,819	103,616	Pumped at South Bay P.P.
0	22	4,335	6,196	1,860	0	26,492	Inflow from Lake Del Valle
0	0	0	0	0	0	0	Outflow at Del Valle P.P.
-10	-32	-10	-10	-12	-12	-156	Operational Losses (-), Gains (+)
							Delivered to Contracting Agencies:
12,066	13,382	12,681	12,906	10,578	10,807	112,574	Project Water
							Del Valle Inflow Exchange and
0	0	0	69	51	0	3,838	Released from Aqueduct
							Del Valle Inflow Released from
0	0	0	0	0	0	2,111	Aqueduct
0	0	0	0	0	0	973	Delivered to San Francisco W.D.
0	0	0	0	0	0	0	Storage Change
							Del Valle Stored Exchange and
4,273	2,075	405	0	0	0	10,456	Released from Aqueduct
							Lake Del Valle Operation:
38,569	37,983	33,102	26,721	24,828	24,723	---	End of Month Storage
-507	-586	-4,881	-6,381	-1,893	-105	-2,155	Storage Change
							SAN LUIS FIELD DIVISION
							O'Neill Forebay Operation
41,660	51,151	52,011	45,341	46,862	52,306	---	End of Month Storage
103	9,491	860	-6,670	1,521	5,444	-2,341	Storage Change
188,513	226,052	196,565	121,373	125,835	155,390	2,079,369	Inflow, California Aqueduct
30,257	15,770	116,466	79,649	172,065	201,009	1,695,669	Inflow, O'Neill P-G Plant
233,238	210,691	1,756	87	58	0	478,819	Inflow, San Luis P-G Plant
4,503	4,978	1,870	897	73	348	18,975	Delivered to Federal Customers
9,619	22,175	0	10,923	0	0	42,717	Outflow, O'Neill P-G Plant
0	6,191	196,793	42,071	120,325	82,538	2,018,498	Outflow, San Luis P-G Plant
+1,137	+3,843	+16,656	+6,112	+13,672	+1,259	+141,559	Operational Losses (-), Gains (+)
438,920	413,521	131,920	160,000	189,711	269,328	2,317,567	Outflow, Dos Amigos P.P.
							San Luis Reservoir Operation
1,751,944	1,541,758	1,718,852	1,752,427	1,852,392	1,926,052	---	End of Month Storage
-235,874	-210,186	177,094	33,575	99,965	73,660	1,362,843	Storage Change
0	6,191	196,793	42,071	120,325	82,538	2,018,498	Inflow, San Luis P-G Plant
-2,636	-5,686	-17,943	-8,409	-20,302	-8,878	-176,836	Operational Losses (-), Gains (+)
233,238	210,691	1,756	87	58	0	478,819	Outflow, San Luis P-G Plant
							California Aqueduct (Pools 14 thru 21)
249,476	246,148	96,081	126,500	131,478	137,769	1,410,043	Inflow, Dos Amigos P.P. (State)
189,444	167,373	35,839	33,500	58,233	131,559	907,524	Inflow, Dos Amigos P.P. (Federal)
0	0	0	0	0	0	38,369	Inflow, Floodwater into Aqueduct
0	0	0	0	0	0	950	Inflow, Well Water Pumped into Aqueduct
1,534	-202	-165	3	-587	9	-320	Storage Change
194,180	170,270	34,524	31,532	56,320	130,699	915,110	Delivered to Federal Customers
0	0	0	0	0	0	855	Delivered Well Water
706	283	0	0	0	0	2,652	Delivered, 1977 Mendota Pool Carryover 1/
0	0	0	0	0	0	-95	Losses, Well Water (-) 2/
+7,818	+10,922	-4,941	-5,759	-4,163	-2,272	-27,025	Operational Losses (-), Gains (+)
249,767	249,723	92,620	122,706	129,815	136,348	1,405,734	Outflow, Check 21 (State)
1,257	4,652	0	0	0	0	8,387	Outflow, Checl 21 (Federal)

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

(Amounts in Acre-feet)

Description	January	February	March	April	May	June
SAN JOAQUIN FIELD DIVISION						
California Aqueduct, Check 21 to Buena Vista Pumping Plant						
Inflow, Check 21 (State)	58,120	71,782	57,774	16,480	40,710	179,889
Inflow, Check 21 (Federal)	1,727	751	0	0	0	0
Inflow, Kern River Intertie (State)	0	0	0	41,684	97,678	38,569
Delivered to State Contracting Agencies	1,750	2,688	5,849	14,027	44,881	79,327
Delivered for Repayment of Preconsolidation Water	0	0	0	349	319	1,267
Delivered to Federal Customers (Cross Valley Canal)	1,727	751	0	0	0	0
Coastal Br. Diversion (Las Per. P.P.)	564	227	325	1,961	11,573	21,208
Storage Change	-1,090	309	-291	-455	-57	-25
Operational Losses (-), Gains (+)	+3,686	+5,231	+5,389	+737	+918	+5,398
Outflow, Buena Vista P.P.	60,582	73,789	57,280	43,019	82,590	122,079
California Aqueduct, Buena Vista P.P. to Wheeler Ridge P.P.						
Inflow, Buena Vista P.P.	60,582	73,789	57,280	43,019	82,590	122,079
Delivered to Contracting Agencies	521	1,696	1,116	2,954	11,679	23,109
Storage Change	-246	360	-144	-128	192	86
Operational Losses (-), Gains (+)	+213	+741	-109	-408	+1,963	-196
Outflow, Wheeler Ridge P.P.	60,520	72,474	56,199	39,785	72,682	98,688
California Aqueduct, Wheeler Ridge P.P. to Wind Gap P.P.						
Inflow, Wheeler Ridge P.P.	60,520	72,474	56,199	39,785	72,682	98,688
Delivered to Contracting Agencies	9	21	30	578	3,125	4,808
Storage Change	-31	47	48	-11	-5	-90
Operational Losses (-), Gains (+)	-607	-367	+15	+346	-492	-650
Outflow, Wind Gap P.P.	59,935	72,039	56,136	39,564	69,070	93,320
California Aqueduct, Wind Gap P.P. to A. D. Edmonston P.P.						
Inflow, Wind Gap P.P.	59,935	72,039	56,136	39,564	69,070	93,320
Delivered to Contracting Agencies	1	0	4	522	1,375	1,062
Storage Change	-61	120	-17	-55	-16	-3
Operational Losses (-), Gains (+)	+493	+153	+720	-90	-591	-1,914
Outflow, A. D. Edmonston P.P.	60,488	72,072	56,869	39,007	67,120	90,347
Coastal Branch, California Aqueduct						
Inflow, Las Perillas P.P.	564	227	325	1,961	11,573	21,208
Delivered to Contracting Agencies	492	222	311	1,718	10,548	19,284
Storage Change	10	-20	12	15	-14	24
Operational Losses (-), Gains (+)	-62	-25	-2	-228	-1,039	-1,900
SOUTHERN FIELD DIVISION						
California Aqueduct, A. D. Edmonston P. P. to Junction of West Branch						
Inflow, A. D. Edmonston P.P.	60,488	72,072	56,869	39,007	67,120	90,347
Storage Change	-3	5	8	-6	-12	-1
Operational Losses (-), Gains (+)	0	+11	-1	-8	-17	-16
Outflow, West Branch	34,655	48,160	44,815	362	16,548	36,020
Outflow, East Branch	25,836	23,918	12,045	38,643	50,567	54,312
California Aqueduct, Junction of West Br. to Pearblossom P.P.						
Inflow	25,836	23,918	12,045	38,643	50,567	54,312
Delivered to Contracting Agencies	39	73	211	1,332	5,450	7,690
Storage Change	328	124	-201	-173	-342	95
Operational Losses (-), Gains (+)	-1	+734	-60	-522	-1,163	-1,090
Outflow, Pearblossom P.P.	25,468	24,455	11,975	36,962	44,296	45,437

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

(Amounts in Acre-feet)

July	August	September	October	November	December	Total	Description
							SAN JOAQUIN FIELD DIVISION
							California Aqueduct, Check 21 to Buena Vista Pumping Plant
249,767	249,723	92,620	122,706	129,815	136,348	1,405,734	Inflow, Check 21 (State)
1,257	4,652	0	0	0	0	8,387	Inflow, Check 21 (Federal)
0	0	0	0	0	0	177,931	Inflow, Kern River Intertie (State)
105,453	133,981	34,853	16,138	19,289	36,168	494,404	Delivered to State Contracting Agencies
1,308	1,299	296	112	0	0	4,950	Delivered for Repayment of Preconsolidation Water
1,257	4,652	0	0	0	0	8,387	Delivered to Federal Customers (Cross Valley Canal)
24,277	19,309	3,897	8,573	3,899	7,175	102,988	Coastal Br. Diversion (Las Per. P.P.)
801	-107	394	-60	-429	185	-845	Storage Change
-2,677	-3,332	+6,122	+1,216	+515	+4,644	+27,827	Operational Losses (-), Gains (+)
115,251	91,909	59,302	99,159	107,571	97,464	1,009,995	Outflow, Buena Vista P.P.
							California Aqueduct, Buena Vista P.P. to Wheeler Ridge P.P.
115,251	91,909	59,302	99,159	107,571	97,464	1,009,995	Inflow, Buena Vista P.P.
34,295	35,480	6,841	4,042	3,683	5,506	130,922	Delivered to Contracting Agencies
-132	-141	298	-61	-233	143	-6	Storage Change
+1,936	+2,652	+1,456	+715	+2,063	+37	+11,063	Operational Losses (-), Gains (+)
83,024	59,222	53,619	95,893	106,184	91,852	890,142	Outflow, Wheeler Ridge P.P.
							California Aqueduct, Wheeler Ridge P.P. to Wind Gap P.P.
83,024	59,222	53,619	95,893	106,184	91,852	890,142	Inflow, Wheeler Ridge P.P.
6,637	5,177	2,353	1,814	2,479	4,117	31,148	Delivered to Contracting Agencies
84	0	-31	50	-46	66	81	Storage Change
-565	+7	-16	+87	-834	+1,042	-2,034	Operational Losses (-), Gains (+)
75,738	54,052	51,281	94,116	102,917	88,711	856,879	Outflow, Wind Gap P.P.
							California Aqueduct, Wind Gap P.P. to A. D. Edmonston P.P.
75,738	54,052	51,281	94,116	102,917	88,711	856,879	Inflow, Wind Gap P.P.
2,170	2,754	1,033	86	72	565	9,644	Delivered to Contracting Agencies
-91	117	-10	-5	-95	83	-33	Storage Change
-1,080	-489	-43	-822	-696	-1,492	-5,851	Operational Losses (-), Gains (+)
72,579	50,692	50,215	93,213	102,244	86,571	841,417	Outflow, A. D. Edmonston P.P.
							Coastal Branch, California Aqueduct
24,277	19,309	3,897	8,573	3,899	7,175	102,988	Inflow, Las Perillas P.P.
21,513	17,566	3,682	8,007	3,788	6,772	93,903	Delivered to Contracting Agencies
-10	-14	-1	17	-91	91	19	Storage Change
-2,774	-1,757	-216	-549	-202	-312	-9,066	Operational Losses (-), Gains (+)
							SOUTHERN FIELD DIVISION
							California Aqueduct, A. D. Edmonston P.P. to Junction of West Branch
72,579	50,692	50,215	93,213	102,244	86,571	841,417	Inflow, A. D. Edmonston P.P.
12	-22	-6	23	3	-7	-6	Storage Change
-13	-11	-33	-15	-7	+4	-106	Operational Losses (-), Gains (+)
18,553	-37	0	26,271	44,140	36,799	306,286	Outflow, West Branch
54,001	50,740	50,188	66,904	58,094	49,783	535,031	Outflow, East Branch
							California Aqueduct, Junction of West Branch to Pearblossom P.P.
54,001	50,740	50,188	66,904	58,094	49,783	535,031	Inflow
9,192	8,792	6,072	4,363	669	462	44,345	Delivered to Contracting Agencies
254	-479	285	388	-380	261	160	Storage Change
-923	-734	-602	-1,098	-496	+303	-5,652	Operational Losses (-), Gains (+)
43,632	41,693	43,229	61,055	57,309	49,363	484,874	Outflow, Pearblossom P.P.

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

(Amounts in Acre-feet)

Description	January	February	March	April	May	June
SOUTHERN FIELD DIVISION (Cont.)						
California Aqueduct, Pearblossom P.P. to Silverwood Lake						
Inflow, Pearblossom P.P.	25,468	24,455	11,975	36,962	44,296	45,437
Deliveries (Exchange of natural inflow)	890	710	640	996	925	750
Storage Change	23	-334	243	-101	-194	271
Operational Losses (-), Gains (+)	-438	+546	+52	-2,171	-1,022	-514
Outflow to Silverwood Lake	24,117	24,625	11,144	33,896	42,543	43,902
Silverwood Lake Operation						
End of Month Storage	60,690	70,751	72,436	73,339	63,548	62,818
Storage Change	18,200	10,061	1,685	903	-9,791	-730
Inflow, Project	24,117	24,625	11,144	33,896	42,543	43,902
Inflow, Natural	6,979	17,575	30,374	10,729	3,826	1,308
Delivered to Contracting Agencies	85	79	88	60	79	121
Outflow, Natural Inflow Released	4,930	15,479	27,888	12,328	18,798	10,569
Outflow, Project Water at San Bernardino Tunnel	8,462	16,425	11,250	32,837	39,239	36,711
Operational Losses (-), Gains (+)	+581	-156	-607	+1,503	+1,956	+1,461
California Aqueduct, Silverwood Lake to Lake Perris						
Inflow, San Bernardino Tunnel	8,462	16,425	11,250	32,837	39,239	36,711
Delivered to Contracting Agencies	2,282	2,686	10,867	17,751	30,247	36,275
Storage Change	12	-3	-8	-3	0	1
Operational Losses (-), Gains (+)	0	0	+3	0	-1	-2
Outflow to Lake Perris	6,168	13,742	394	15,089	8,991	433
Lake Perris Operation						
End of Month Storage	85,747	100,168	100,358	114,563	108,663	103,235
Storage Change	6,525	14,421	190	14,205	-5,900	-5,428
Inflow	6,168	13,742	394	15,089	8,991	433
Delivered to Contracting Agencies	194	208	241	235	12,767	3,723
Operational Losses (-), Gains (+)	+551	+887	+37	-649	-2,124	-2,138
Outflow	0	0	0	0	0	0
West Branch California Aqueduct from Junction to Oso P.P.						
Inflow	34,655	48,160	44,815	362	16,548	36,020
Storage Change	-10	16	24	-18	-38	-3
Delivered to Contracting Agencies	0	0	0	0	0	0
Operational Losses (-), Gains (+)	0	+32	-4	-25	-51	-48
Outflow, Oso Pumping Plant	34,665	48,176	44,787	355	16,535	35,975
West Branch California Aqueduct Oso P.P. to Pyramid Lake						
Inflow, Oso P.P.	34,665	48,176	44,787	355	16,535	35,975
Storage Change	1,865	-95	496	204	-2,753	1,628
Delivered to Contracting Agencies	0	0	0	0	0	0
Operational Losses (-), Gains (+)	+50	+10	+385	-151	-205	-258
Outflow to Pyramid Lake	32,850	48,281	44,676	0	19,083	34,089

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

(Amounts in Acre-feet)

July	August	September	October	November	December	Total	Description
							SOUTHERN FIELD DIVISION (Cont.)
							California Aqueduct, Pearblossom P.P. to Silverwood Lake
43,632	41,693	43,229	61,055	57,309	49,363	484,874	Inflow, Pearblossom P.P.
484	149	296	301	555	648	7,344	Deliveries (Exchange of natural inflow)
15	56	33	48	-93	204	171	Storage Change
-95	-559	-236	-1,739	-958	-2,036	-9,170	Operational Losses (-), Gains (+)
43,038	40,929	42,664	58,967	55,889	46,475	468,189	Outflow to Silverwood Lake
							Silverwood Lake Operation
65,121	65,628	62,996	64,471	69,360	71,263	---	End of Month Storage
2,303	507	-2,632	1,475	4,889	1,903	28,773	Storage Change
43,038	40,929	42,664	58,967	55,889	46,475	468,189	Inflow, Project
435	129	369	153	770	2,016	74,663	Inflow, Natural
137	147	100	115	85	130	1,226	Delivered to Contracting Agencies
20	19	18	19	19	1,005	91,092	Outflow, Natural Inflow Released
41,332	40,819	45,523	57,433	51,283	47,846	429,160	Outflow, Project Water at San Bernardino Tunnel
+319	+434	-24	-78	-383	+2,393	+7,399	Operational Losses (-), Gains (+)
							California Aqueduct, Silverwood Lake to Lake Perris
41,332	40,819	45,523	57,433	51,283	47,846	429,160	Inflow, San Bernardino Tunnel
39,759	40,637	40,447	45,160	29,404	25,639	321,154	Delivered to Contracting Agencies
-2	13	1	-13	-1	1	-2	Storage Change
-3	-3	-2	-1	-1	-1	-11	Operational Losses (-), Gains (+)
1,572	166	5,073	12,285	21,879	22,205	107,997	Outflow to Lake Perris
							Lake Perris Operation
90,330	76,465	68,925	69,910	86,525	106,482	---	End of Month Storage
-12,905	-13,865	-7,540	985	16,615	19,957	27,260	Storage Change
1,572	166	5,073	12,285	21,879	22,205	107,997	Inflow
12,617	12,647	12,203	12,632	6,928	2,597	76,992	Delivered to Contracting Agencies
-1,860	-1,384	-410	+1,332	+1,664	+349	-3,745	Operational Losses (-), Gains (+)
0	0	0	0	0	0	0	Outflow
							West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.
18,553	-37	0	26,271	44,140	36,799	306,286	Inflow
35	-69	0	72	8	-21	-4	Storage Change
0	0	0	0	0	0	0	Delivered to Contracting Agencies
-41	-32	0	-45	-20	+12	-222	Operational Losses (-), Gains (+)
18,477	0	0	26,154	44,112	36,832	306,068	Outflow, Oso Pumping Plant
							West Branch California Aqueduct Oso P.P. to Pyramid Lake
18,477	0	0	26,154	44,112	36,832	306,068	Inflow, Oso P.P.
927	-1,799	-1,766	2,639	-848	1,627	2,125	Storage Change
0	0	0	0	0	0	0	Delivered to Contracting Agencies
-271	-299	-142	-160	-75	-145	-1,261	Operational Losses (-), Gains (+)
17,279	1,500	1,624	23,355	44,885	35,060	302,682	Outflow to Pyramid Lake

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION

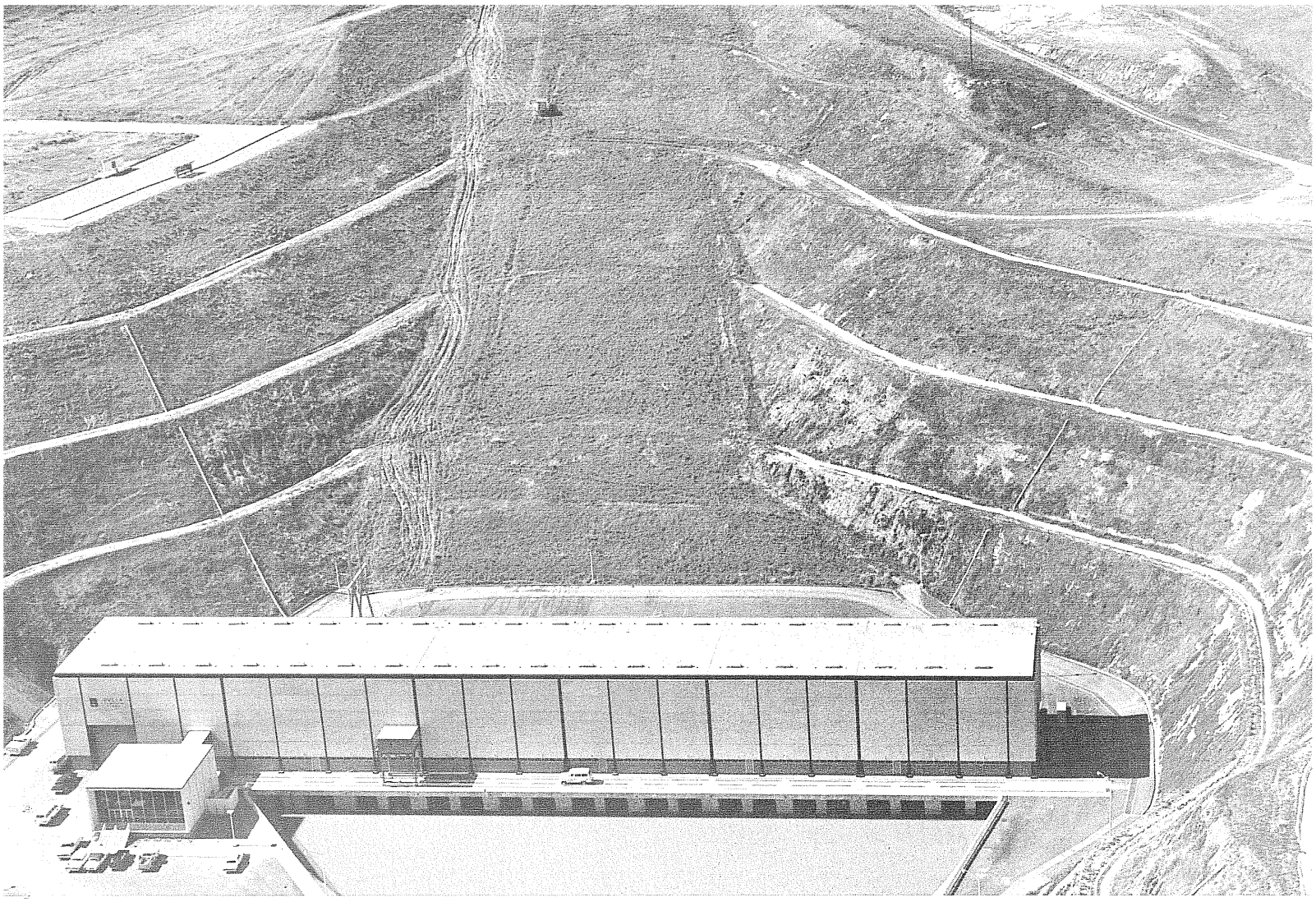
(Amounts in Acre-feet) 1978

Description	January	February	March	April	May	June
SOUTHERN FIELD DIVISION (Cont.)						
Pyramid Lake Operation						
End of Month Storage	163,174	164,031	167,652	169,682	166,045	161,895
Storage Change	-4,593	857	3,621	2,030	-3,637	-4,150
Inflow, Project	32,850	48,281	44,676	0	19,083	34,089
Inflow, Natural (from local runoff)	7,538	38,128	48,678	15,638	6,463	2,547
Inflow, Pumpback from Elderb. Forebay	9,860	402	203	28,969	53,224	64,795
Operational Losses (-), Gains (+)	-220	+828	+10,658	+893	-1,928	-3,282
Outflow, Angeles Tunnel to Elderb. Fby.	43,646	65,528	96,056	42,059	76,605	98,010
Outflow, Natural Inflow Released to Piru Creek	10,975	21,254	4,538	1,411	3,874	4,289
Elderberry Forebay Operation						
End of Month Storage	24,638	12,153	28,047	27,635	22,956	25,719
Storage Change	2,058	-12,485	15,894	-412	-4,679	2,763
Inflow, Project thru Castaic P-G Plant	43,646	65,528	96,056	42,059	76,605	98,010
Inflow, Natural	3,700	16,709	25,895	5,162	2,134	856
Operational Losses (-), Gains (+)	-1,123	-18,020	-8,234	-2,422	-2,321	-1,754
Outflow, Pumpback to Pyramid Lake	9,860	402	203	28,969	53,224	64,795
Outflow, Project Water Released to Castaic Lake	29,872	59,591	28,923	11,080	25,739	28,698
Outflow, Natural Inflow Released to Castaic Lake	4,433	16,709	68,697	5,162	2,134	856
Castaic Lake Operation						
End of Month Storage	87,709	185,378	303,174	318,430	314,108	309,364
Storage Change	36,668	97,669	117,796	15,256	-4,322	-4,744
Inflow, Project	29,872	59,591	28,923	11,080	25,739	28,698
Inflow, Natural	2,947	10,793	21,032	5,984	2,238	1,000
Inflow, Natural Released from Elderberry Forebay	4,433	16,709	68,697	5,162	2,134	856
Delivered to Contracting Agencies	2,658	6,519	4,405	5,741	32,385	27,645
Operational Losses (-), Gains (+)	+2,074	+17,095	+3,549	-136	+2,768	+3,079
Outflow, Castaic Afterbay	0	0	0	1,093	4,816	10,732
Castaic Lagoon Operation						
Inflow	0	0	0	1,093	4,816	10,732
Change in Storage	303	624	390	206	34	18
Operational Losses (-), Gains (+)	+489	+792	+576	-34	-120	-124
Outflow, Subsurface	186	168	186	180	185	179
Outflow, Surface	0	0	0	673	4,477	10,411

SUMMARY OF CALIFORNIA AQUEDUCT OPERATION
1978

(Amounts in Acre-feet)

July	August	September	October	November	December	Total	Description
							SOUTHERN FIELD DIVISION (Cont.)
							Pyramid Lake Operation
165,194	165,308	166,975	165,067	167,039	160,834	---	End of Month Storage
3,299	114	1,667	-1,908	1,972	-6,205	-6,933	Storage Change
17,279	1,500	1,624	23,355	44,885	35,060	302,682	Inflow, Project
1,309	802	897	823	1,192	1,635	125,650	Inflow, Natural (from local runoff)
82,951	11,899	80,837	29,610	2,319	521	365,590	Inflow, Pumpback from Elderb. Forebay
-4,076	-2,148	-4,649	-1,429	-1,894	-692	-7,939	Operational Losses (-), Gains (+)
92,831	10,392	75,810	53,089	43,334	39,722	737,082	Outflow, Angeles Tunnel
1,333	1,547	1,232	1,178	1,196	3,007	55,834	Outflow, Natural Inflow Released to Piru Creek
							Elderberry Forebay Operation
23,622	23,080	22,463	25,982	17,773	17,262	---	End of Month Storage
-2,097	-542	-617	3,519	-8,209	-511	-5,318	Storage Change
92,831	10,392	75,810	53,089	43,334	39,722	737,082	Inflow, Project thru Castaic P-G Plant
274	77	68	64	370	861	56,170	Inflow, Natural
+1,070	+888	+4,342	-50	-485	-881	-28,990	Operational Losses (-), Gains (+)
82,951	11,899	80,837	29,610	2,319	521	365,590	Outflow, Pumpback to Pyramid Lake
13,047	0	0	19,765	48,739	38,831	304,285	Outflow, Project Water Released to Castaic Lake
274	0	0	209	370	861	99,705	Outflow, Natural Inflow Released to Castaic Lake
							Castaic Lake Operation
294,133	276,542	252,694	247,272	274,468	294,154	---	End of the Month Storage
-15,231	-17,591	-23,848	-5,422	27,196	19,686	243,113	Storage Change
13,047	0	0	19,765	48,739	38,831	304,285	Inflow, Project
454	190	229	162	374	665	46,068	Inflow, Natural
274	0	0	209	370	861	99,705	Inflow, Natural Release from Elderberry Forebay
24,626	15,987	23,021	21,650	17,556	16,935	199,128	Delivered to Contracting Agencies
+1,687	-1,200	-108	-328	+678	+1,095	+30,253	Operational Losses (-), Gains (+)
6,067	594	948	3,580	5,409	4,831	38,070	Outflow, Castaic Afterbay
							Castaic Lagoon Operation
6,067	594	948	3,580	5,409	4,831	38,070	Inflow
-50	-206	+208	6	32	-50	1,515	Change in Storage
-140	-125	-114	-90	-60	-49	+1,001	Operational Losses (-), Gains (+)
184	184	178	184	180	184	2,178	Outflow, Subsurface
5,793	491	448	3,300	5,137	4,648	35,378	Outflow, Surface



PUMPING PLANTS

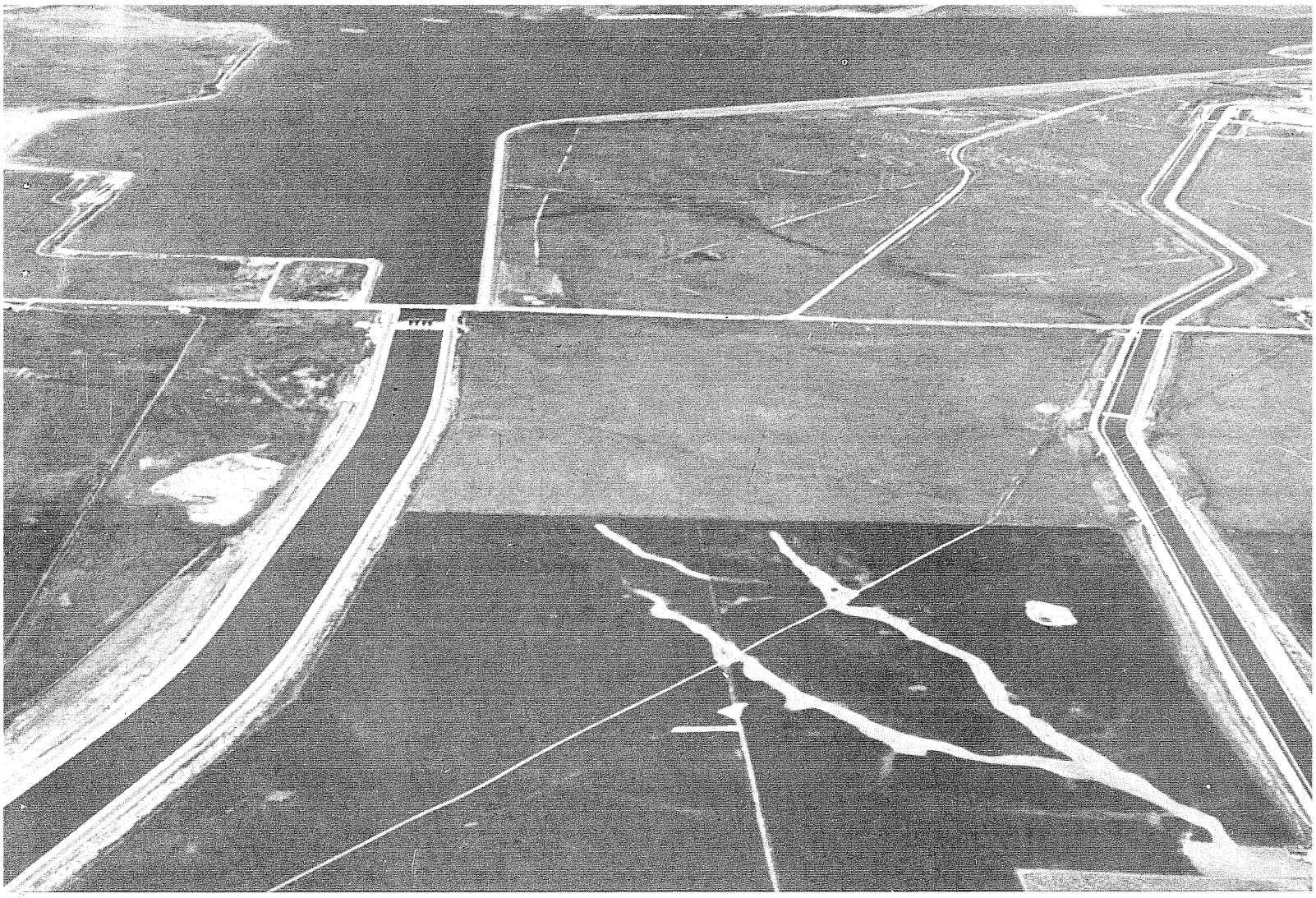
SECTION III

PROJECT PUMPING PLANTS 1/
1978

Amounts in acre-feet

Pumping Plant	January	February	March	April	May	June	July	August	September	October	November	December	Total
Hyatt	11,035	8,560	522	21,674	7,388	3,312	0	44	0	0	9,080	18,818	80,433
Thermalito	8,330	8,380	552	23,193	6,389	3,500	0	0	0	0	10,001	21,141	81,486
Cordelia	3,112	255	3,836	5,045	10,966	13,436	16,349	15,467	8,761	6,789	8,781	10,819	103,616
Delta State	365,379	343,310	107,705	32,154	58,550	194,524	210,237	242,492	210,609	126,609	135,156	168,832	2,195,557
Federal	0	0	0	2,478	0	6,295	1,839	4,343	0	273	0	0	15,228
South Bay	3,112	255	3,836	5,045	10,966	13,436	16,349	15,467	8,761	6,789	8,781	10,819	103,616
Del Valle	0	0	0	0	0	0	0	0	0	0	0	0	0
1/ San Luis State	328,293	308,582	59,556	6,167	1,380	0	0	6,191	104,625	286	237	25,860	841,177
Federal	251,067	230,803	229,936	138,609	8,705	0	0	0	91,017	41,785	120,088	56,678	1,168,688
2/ O'Neill (USBR) Federal	237,521	221,690	247,108	158,550	75,098	142,892	30,257	15,770	116,466	79,650	171,665	201,015	1,697,682
State	0	0	0	0	0	0	0	0	0	0	0	0	0
1/ Dos Amigos State	53,327	54,550	66,734	14,169	53,702	175,270	246,190	244,256	96,081	126,500	131,478	137,769	1,400,026
Federal	2,482	8,959	22,283	33,161	59,520	169,731	192,930	169,265	35,839	33,500	58,233	131,559	917,462
Las Perillas	564	227	325	1,961	11,573	21,208	24,277	19,309	3,897	8,573	3,899	7,175	102,988
Badger Hill	564	238	347	1,951	11,622	20,915	23,814	18,603	3,860	8,476	3,881	7,210	101,481
Buena Vista	60,582	73,789	57,280	43,019	82,590	122,079	115,251	91,909	59,302	99,159	107,571	97,464	455,405
Wheeler Ridge	60,520	72,474	56,199	39,785	72,682	98,688	83,024	59,222	53,619	95,893	106,184	91,852	890,142
Wind Gap	59,935	72,039	56,136	39,564	69,070	93,320	75,738	54,052	51,281	94,116	102,917	88,711	856,879
A. D. Edmonston	60,488	72,072	56,869	39,007	67,120	90,347	72,579	50,692	50,215	93,213	102,244	86,571	841,417
Oso	34,665	48,176	44,787	355	16,535	35,975	18,477	0	0	26,154	44,112	36,832	306,068
Castaic	9,860	402	203	28,969	53,224	64,795	82,951	11,899	80,837	29,610	2,319	521	365,590
Pearblossom	25,468	24,455	11,975	36,962	44,296	45,437	43,632	41,693	43,229	61,055	57,309	49,363	484,874

1/ Joint State-Federal Facility
2/ O'Neill Pumping Plant is a federal USBR facility



JOINT SAN LUIS FACILITIES

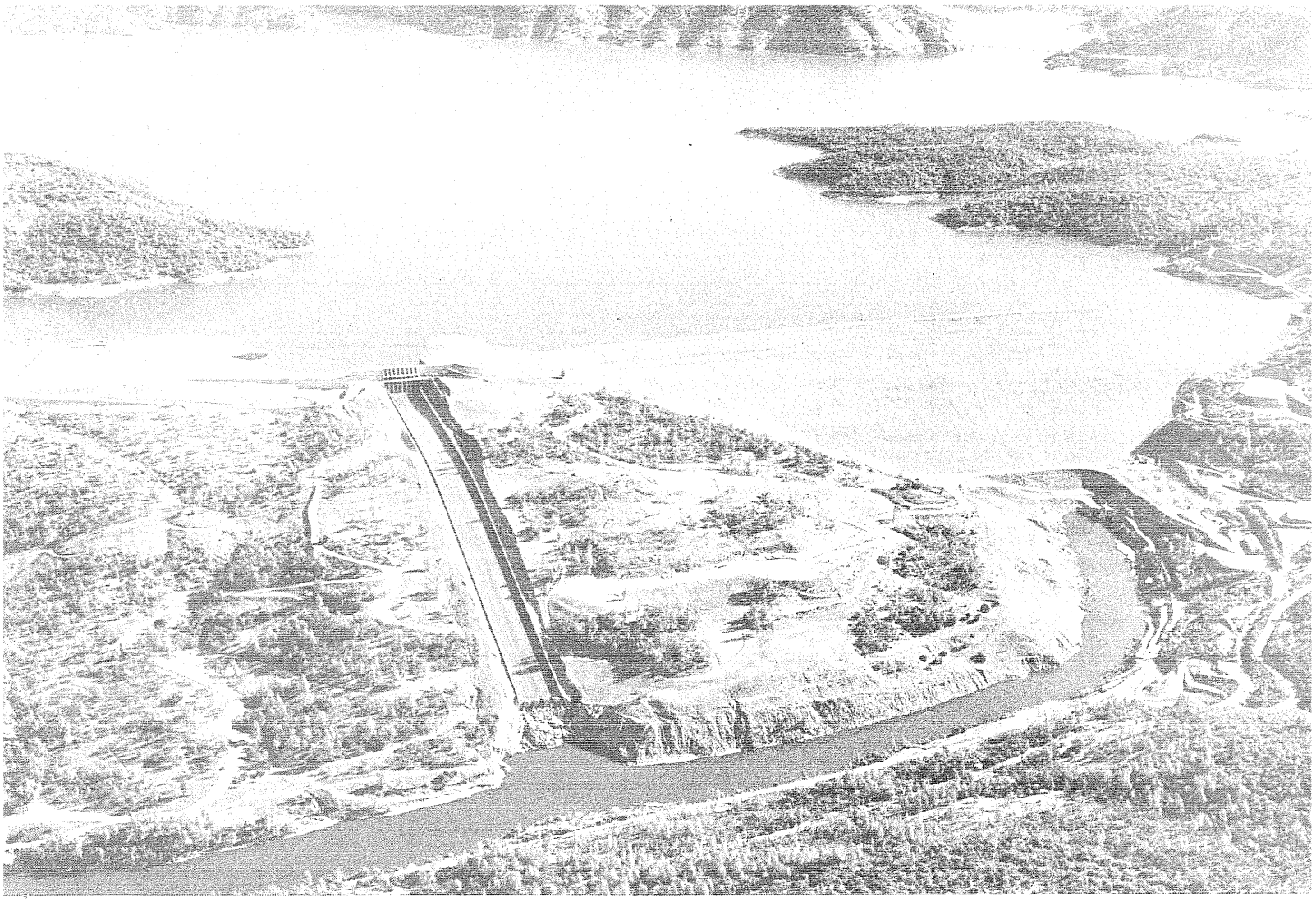
SECTION IV

MONTHLY OPERATIONS SUMMARY
STATE-FEDERAL JOINT SAN LUIS FACILITIES
19 78

Amounts in acre-feet unless noted.

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Check 12	State	367000	343142	102227	26278	42684	175537	186674	221709	196565	121100	125835	155390	2,064,141
	Federal	0	0	0	2478	0	6295	1839	4343	0	273	0	0	15,228
	Total	367000	343142	102227	28756	42684	181832	188513	226052	196565	121373	125835	155390	2,079,369
O'Neill Pumping and Generating Plant Amount Pumped	State	0	0	0	0	0	0	0	0	0	0	0	0	0
	Federal	237521	221691	247112	158556	72682	142891	30257	15570	116466	79649	172065	201009	1,695,669
	Total	237521	221691	247112	158556	72682	142891	30257	15570	116466	79649	172065	201009	1,695,669
Released for Generation	Federal	0	0	0	0	0	0	9619	22175	0	10923	0	0	42,717
O'Neill Forebay End-of-Month Storage	State	24304	16507	19856	21831	18997	21858	33687	24719	29738	27501	29199	21652	XXXX
	Federal	25146	28782	29753	24032	20327	19699	7973	26432	22273	17840	17663	30654	XXXX XXXX
	Total	49450	45289	49609	45863	39324	41557	41660	51151	52011	45341	46862	52306	XXXX
San Luis Reservoir End-of-Month Storage	State	727379	1019477	1063648	1065228	1061836	1048802	973346	956862	1051619	1047193	1036206	1057183	XXXX
	Federal	381118	598436	815784	950675	956605	939016	778598	584896	667233	705234	816186	868869	XXXX XXXX
	Total	1108497	1617913	1879432	2015903	2018441	1987818	1751944	1541758	1718852	1752427	1852392	1926052	XXXX
San Luis Pumping and Generating Plant Amount Pumped	State	328293	308582	59556	6167	1380	4578	0	6191	105777	286	237	25860	846,907
	Federal	251067	230805	229936	138609	8705	2902	0	0	91016	41785	120088	56678	1,171,591
	Total	579360	539387	289492	144776	10085	7480	0	6191	196793	42071	120325	82538	2,018,498
Released for Generation	State	0	0	0	42	1381	14017	74006	19548	1151	87	58	0	110,290
	Federal	0	0	0	0	0	17549	159232	191143	605	0	0	0	368,529
	Total	0	0	0	42	1381	31566	233238	210691	1756	87	58	0	478,819
Dos Amigos Pumping Plant Amount Pumped	State	54726	61015	57857	18774	46994	183225	249476	246148	96081	126500	131478	137769	1,410,043
	Federal	1083	2494	31160	28560	66228	162051	189444	167373	35839	33500	58233	131559	907,524
	Total	55809	63509	89017	47334	113222	345276	438920	413521	131920	160000	189711	269328	2,317,567

DWR 3638



OPERATION OF RESERVOIRS

SECTION V

UPPER FEATHER AREA LAKES
MONTHLY OPERATION

1978

(From preliminary records)

Month	Lake Storage			Outflow							Inflow
				Regulated Release							
	Water Surface Elevation in feet	Storage	Storage Change	Streamflow Maint.	Water Supply Contract	Water Right Entitlement	Total Regulated Release	Spill	Estimated Evaporation and Seepage	Total Outflow	Computed or Estimated
	1	2	3	4	5	6	7	8	9	10	11
ANTELOPE LAKE				*Capacity* 22,566 *ac-ft*							
Jan	4976.08	5,662	1,735	61	0	0	61	0	25	86	1,821
Feb	4979.07	6,923	1,261	315	0	0	315	0	30	345	1,606
Mar	4990.03	12,992	6,069	974	0	0	974	0	63	1,037	7,106
Apr	4998.10	19,098	6,106	1190	0	0	1190	0	152	1,342	7,448
May	5002.71	23,232	4,134	1230	0	0	1230	4,268	298	5,796	9,930
June	5001.97	22,538	-694	1190	0	0	1190	1,628	555	3,373	2,679
July	5000.64	21,319	-1,219	1230	0	0	1230	0	626	1,856	637
Aug	4998.74	19,644	-1,675	1230	0	0	1230	0	609	1,839	164
Sept	4997.40	18,511	-1,133	1047	0	0	1047	0	382	1,429	296
Oct	4995.74	17,164	-1,347	1230	0	0	1230	0	341	1,571	224
Nov	4994.43	16,145	-1,019	1190	0	0	1190	0	124	1,314	295
Dec	4993.06	15,118	-1,027	1230	0	0	1230	0	82	1,312	285
Tot	--	--	11,191	12117	0	0	12117	5,896	3,287	21,300	32,491
FRENCHMAN LAKE				*Capacity* 55,477 *ac-ft*							
Jan	5542.35	9,352	1,174	141	0	0	141	0	34	175	1,349
Feb	5544.93	10,699	1,347	128	0	0	128	0	36	164	1,511
Mar	5559.80	21,296	10,597	141	0	0	141	0	85	226	10,823
Apr	5566.40	27,550	6,254	123	210	0	333	0	193	526	6,780
May	5567.09	28,259	709	0	3060	0	3060	0	341	3,401	4,110
June	5563.76	24,936	-3,323	0	3650	0	3650	0	586	4,236	913
July	5561.11	22,463	-2,473	0	2099	0	2099	0	637	2,736	263
Aug	5558.39	20,082	-2,381	0	1857	0	1857	0	597	2,454	73
Sept	5557.51E	19,346	-736	0	520	0	520	0	375	895	159
Oct	5557.12	19,025	-321	54	116	0	170	0	345	515	194
Nov	5557.12	19,025	0	120	0	0	120	0	131	251	251
Dec	5557.20	19,091	66	135	0	0	135	0	90	225	291
Tot	--	--	10,913	842	11512	0	12354	0	3,450	15,804	26,717
LAKE DAVIS				*Capacity* 84,371 ac-ft							
Jan	5761.48	39,432	3,953	275	4	0	279	0	179	458	4,411
Feb	5762.34	41,720	2,288	250	0	0	250	0	187	437	2,725
Mar	5766.04	52,443	10,723	563	0	0	563	0	344	907	11,630
Apr	5768.71	61,080	8,637	829	0	0	829	0	650	1,479	10,116
May	5769.76	64,683	3,603	737	19	118	874	0	1,137	2,011	5,614
June	5769.35	63,262	-1,421	406	76	302	784	0	1,800	2,584	1,163
July	5768.67	60,945	-2,317	246	80	369	695	0	1,850	2,545	228
Aug	5767.82	58,117	-2,828	246	47	369	662	0	2,227	2,889	61
Sept	5767.48	57,007	-1,110	225	12	135	372	0	1,470	1,842	732
Oct	5767.11	55,813	-1,194	246	23	0	269	0	1,355	1,624	430
Nov	5767.12	55,845	32	232	15	0	247	0	513	760	792
Dec	5767.14	55,910	65	251	2	0	253	0	353	606	671
Tot	--	--	20,431	4,506	278	1,293	6,077	0	12,065	18,142	38,573

LAKE OROVILLE
MONTHLY OPERATION

Amounts in acre-feet unless noted

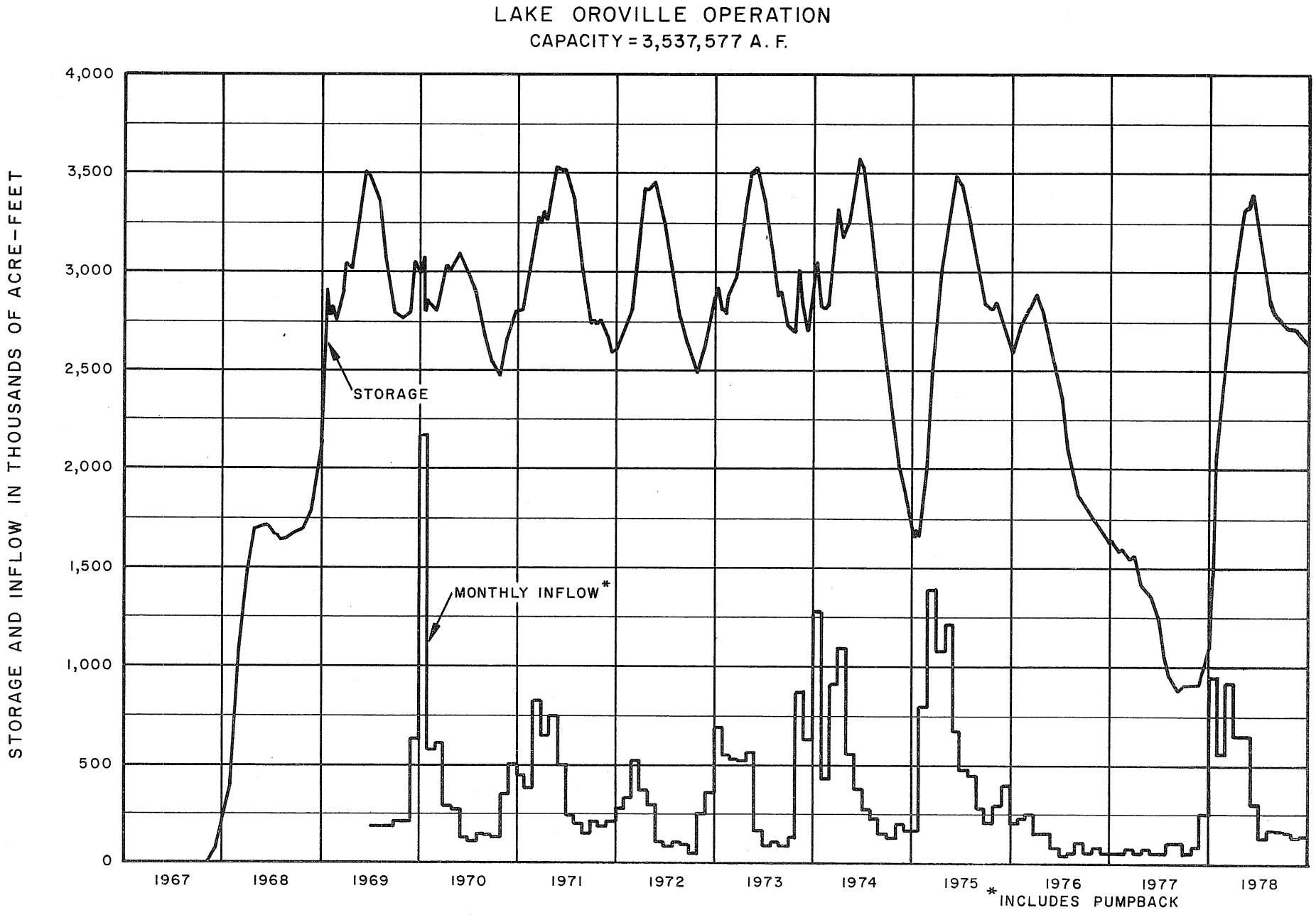
Capacity 3,537,577 acre-feet

MONTH	YEAR	WATER SURFACE ELEVATION IN FEET	STORAGE	STORAGE CHANGE	OUTFLOW						TOTAL INFLOW	
					POWER	PALERMO CANAL	SPILLWAY LEAKAGE	EVAPORATION	SPILL	TOTAL OUTFLOW	PUMPBACK	INFLOW*
JAN	1978	785.31	2,030,415	910,498	45,897	76	0	546	0	46,519	11,035	945,982
	1977	742.20	1,605,898	-21,356	123,605	260	0	691	0	124,556	51,783	51,417
FEB	1978	828.10	2,525,098	494,683	63,511	74	16	1,062	0	64,663	8,560	550,786
	1977	738.47	1,572,411	-33,487	120,065	146	0	1,451	0	121,662	38,505	49,670
MAR	1978	852.47	2,841,617	316,519	608,980	78	228	2,430	0	611,716	522	927,713
	1977	737.58	1,564,494	-7,917	154,850	105	0	2,055	0	157,010	74,778	74,315
APR	1978	875.71	3,168,365	326,748	336,137	128	286	3,116	0	339,667	21,674	644,741
	1977	719.17	1,406,826	-157,668	213,780	784	0	3,657	0	218,221	0	60,553
MAY	1978	887.54	3,344,538	176,173	373,311	604	486	7,422	0	381,823	7,388	550,608
	1977	712.61	1,353,410	-53,416	122,728	790	0	2,752	0	126,270	625	72,229
JUN	1978	886.63	3,330,742	-13,796	300,296	1,156	587	9,145	0	311,243	3,312	294,135
	1977	693.13	1,202,953	-150,457	191,043	1,242	0	4,873	0	197,158	0	46,701
JUL	1978	865.51	3,021,859	-308,883	417,860	1,259	452	11,116	0	430,687	0	121,804
	1977	663.46	996,872	-206,081	242,113	1,277	0	5,454	0	248,844	0	42,763
AUG	1978	849.02	2,795,226	-226,633	391,981	1,494	224	10,315	0	404,014	44	177,337
	1977	646.68	891,820	-105,052	197,801 1/	1,297	0	4,373	0	203,471	0	98,419
SEP	1978	845.18	2,744,217	-51,009	214,583	1,346	214	7,184	0	223,327	0	172,318
	1977	650.52	915,160	23,340	56,896 1/	1,061	0	3,219	15,932 2/	77,108	0	100,448
OCT	1978	843.94	2,727,885	-16,332	162,608	1,166	192	6,129	0	170,095	0	153,763
	1977	648.91	905,324	-9,836	40,105 1/	661	0	2,514	27,787 2/	71,067	0	61,231
NOV	1978	842.37	2,707,306	-20,579	149,902	490	179	2,283	0	152,854	9,080	123,195
	1977	650.94	917,738	12,444	60,413	278	0	1,262	3,799 2/	65,752	0	78,196
DEC	1978	838.19	2,653,028	-54,278	198,481	121	131	1,104	0	199,837	18,818	126,741
	1977	681.64	1,119,917	202,179	50,682	148	0	680	0	51,510	0	253,689
TOTAL	1978	--	--	1,533,111	3,263,547	7,992	2,995	61,852	0	3,336,445	80,422	4,789,123
	1977	--	--	-507,307	1574,081	8,049	0	32,981	47,518	1,662,629	165,691	989,631

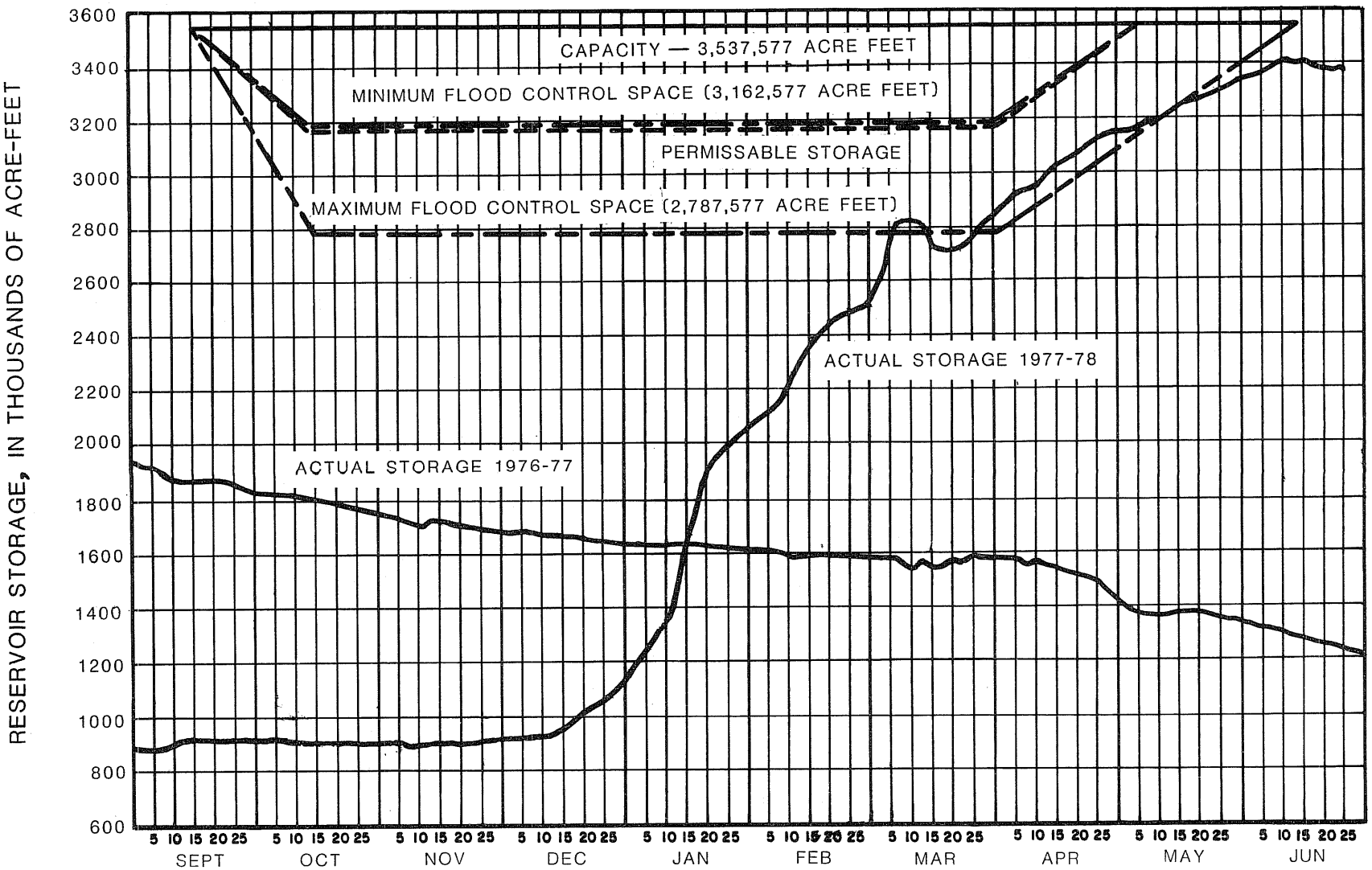
*Computed inflow excluding pumpback.

1/ Includes Wicket Gate leakage.

2/ Release thru river outlet

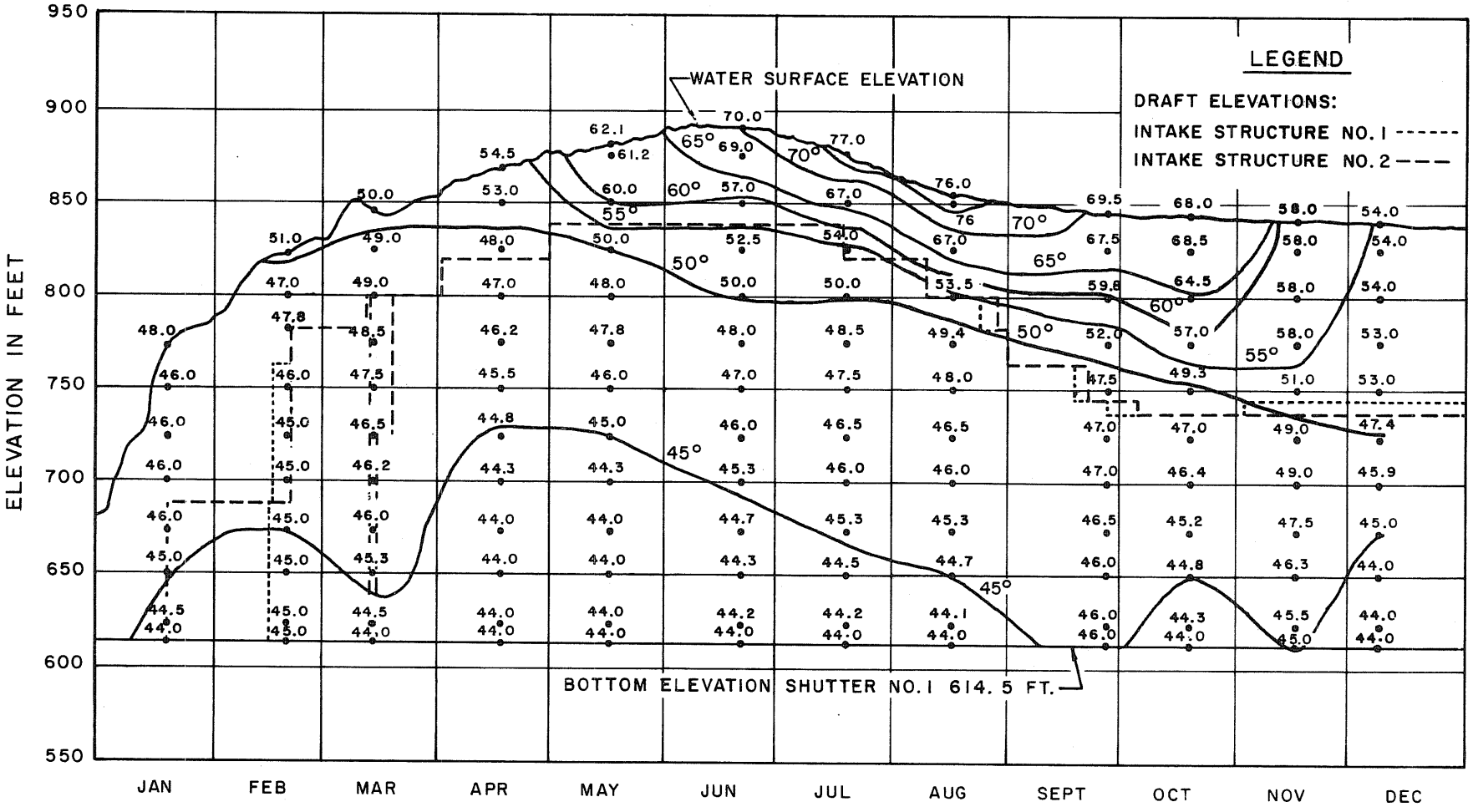

LAKE OROVILLE OPERATION
CAPACITY = 3,537,577 A. F.
STORAGE AND INFLOW IN THOUSANDS OF ACRE-FEET
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
STORAGE
MONTHLY INFLOW*
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
* INCLUDES PUMPBACK

OPERATION OF LAKE OROVILLE FOR FLOOD CONTROL 1977-78



LAKE OROVILLE
ISOTHERMS – 1978

(IN DEGREES FAHRENHEIT)



OROVILLE-THERMALITO COMPLEX
MONTHLY STORAGE

Elevation in feet, storage in acre-feet

Month	Year	Thermalito Diversion Dam Pool		Thermalito Forebay		Thermalito Afterbay	
		Elevation	Storage	Elevation	Storage	Elevation	Storage
Jan.	1978	223.44	12,853	223.60	10,898	127.33	23,863
	1977	223.62	12,910	224.18	11,256	124.85	17,210
Feb.	1978	224.06	13,050	223.76	10,997	127.01	22,948
	1977	224.10	13,063	224.10	11,206	127.14	23,318
Mar.	1978	223.60	12,904	224.14	11,231	134.15	47,313
	1977	223.26	12,796	223.24	10,679	125.20	18,088
Apr.	1978	223.41	12,843	223.82	11,033	131.81	38,431
	1977	223.11	12,748	223.14	10,618	129.35	30,024
May	1978	223.50	12,872	223.74	10,984	130.51	33,867
	1977	223.19	12,774	223.22	10,667	126.17	20,627
June	1978	223.99	13,028	223.18	10,643	133.87	46,207
	1977	224.32	13,134	224.28	11,318	126.59	21,773
July	1978	223.92	13,006	222.54	10,257	130.16	32,684
	1977	223.30	12,808	223.34	10,740	128.40	27,043
Aug.	1978	223.00	12,714	223.09	10,588	134.01	46,758
	1977	223.22	12,783	223.40	10,776	130.86	35,069
Sept.	1978	223.62	12,910	223.56	10,874	129.32	29,928
	1977	223.59	12,900	223.62	10,911	124.36	16,012
Oct.	1978	223.81	12,970	223.60	10,898	124.99	17,559
	1977	222.34	12,506	220.00	10,173	123.48	13,957
Nov.	1978	223.84	12,980	223.86	11,058	125.89	19,878
	1977	223.08	12,739	223.00	10,534	124.45	16,229
Dec.	1978	223.59	12,900	223.44	10,801	128.05	25,982
	1977	222.34	12,506	222.46	10,209	124.85	17,210

CLIFTON COURT FOREBAY
MONTHLY OPERATION

In acre-feet, except elevation, which is in feet.

Month	Year	Water Surface Elevation	End of Month Storage	Storage Change	Inflow
Jan.	1978	0.11	18,499	-368	365,011
	1977	-2.27	13,386	-2,231	202,881
Feb.	1978	0.80	19,987	1,488	344,798
	1977	-1.92	14,137	751	109,441
Mar.	1978	2.85	24,418	4,431	112,084
	1977	0.62	19,599	5,462	105,892
Apr.	1978	2.50	23,660	-758	34,172
	1977	-1.06	15,983	-3,616	16,653
May	1978	0.88	20,159	-3,501	62,541
	1977	0.20	18,693	2,710	80,518
June	1978	0.20	18,693	-1,466	207,780
	1977	-0.96	16,198	-2,495	22,913
July	1978	-1.51	15,016	-3,677	215,871
	1977	-0.01	18,240	2,042	31,357
Aug.	1978	0.21	18,716	3,700	257,869
	1977	1.02	20,439	2,199	26,131
Sept.	1978	1.36	21,195	2,479	217,610
	1977	-0.57	17,036	-3,403	9,947
Oct.	1978	1.75	22,038	843	129,394
	1977	-0.28	17,661	625	10,325
Nov.	1978	1.93	22,428	390	135,546
	1977	0.49	19,318	1,657	52,977
Dec.	1978	1.64	21,800	-628	171,204
	1977	0.28	18,867	-451	218,386
Total	1978	--	--	2,933	2,253,880
	1977	--	--	3,250	887,421

LAKE DEL VALLE
MONTHLY OPERATION

1978

Amounts in acre-feet unless noted

MONTH	ELEVATION (feet)	STORAGE	STORAGE CHANGE	INFLOW		OUTFLOW					PRECIPITATION (inches)
				NATURAL	SOUTH BAY AQUEDUCT	SOUTH BAY AQUEDUCT	RECREATION 1/	ARROYO VALLE	TOTAL	EVAPORATION	
JAN.	698.64	36,903	10,033	14,794	0	3,467	0	1,256	4,723	38	5.16
FEB.	701.12	38,596	1,693	11,754	0	4,707	1	5,297	10,005	56	2.70
MAR.	703.02	39,927	1,331	11,775	0	3,475	1	6,870	10,346	98	2.66
APR.	702.88	38,828	-99	2,428	0	2,005	1	379	2,385	142	2.88
MAY	702.39	39,483	-345	464	0	425	17	30	472	337	0.02
JUNE	701.81	39,076	-407	-30	0	0	18	0	18	359	0.00
JULY	701.08	38,569	-507	-50	0	0	16	0	16	441	0.00
AUG.	700.23	37,983	-586	-90	0	22	21	0	43	453	0.00
SEPT.	692.80	33,102	-4,881	-175	0	4,335	15	0	4,350	356	0.00
OCT.	681.80	26,721	-6,381	69	0	6,196	13	0	6,209	241	0.00
NOV.	678.10	24,828	-1,893	51	0	1,860	1	0	1,861	83	0.00
DEC.	677.89	24,723	-105	-42	0	0	12	0	12	51	0.40
TOTAL	--	--	-2,147	40,948	0	26,492	116	13,832	40,440	2,655	

1/ To East Bay Regional Park District.

O'NEILL FOREBAY
MONTHLY OPERATION

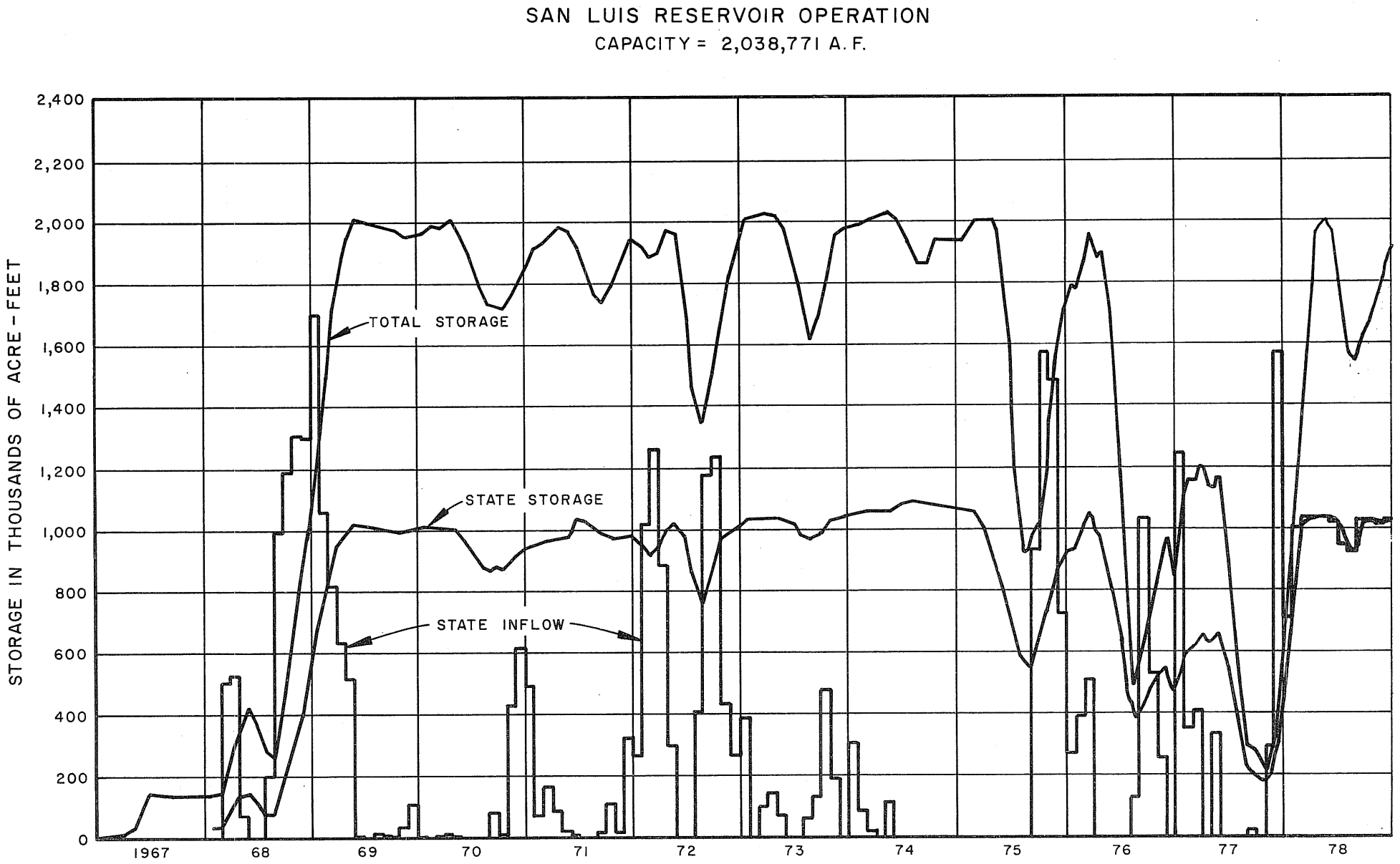
In acre-feet unless noted

Month	Year	Reservoir Storage			Inflow			Outflow				Gains (+) Loss (-)
		Water Surface Elevation in ft.	Storage	Monthly Storage Change	O'Neill Pumping	San Luis Generation	Calif. Aqueduct Check 12	O'Neill Generation	San Luis Pumping	Dos Amigos Pumping	Deliveries	
JAN	1978	222.40	49,450	-5,197	237,521	0	367,000	0	579,360	55,809	21	-25,472
	1977	220.29	43,907	-7,942	171,454	12,731	242,997	0	76,904	355,279	548	12,823
FEB	1978	220.82	45,289	-4,161	221,691	0	343,142	0	539,387	63,509	22	-33,924
	1977	224.03	53,811	1,209	61,737	0	96,124	442	71,827	89,849	200	5,666
MAR	1978	222.46	49,609	4,320	247,112	0	102,227	0	289,492	89,017	210	-33,700
	1977	223.95	53,596	-215	43,590	4,475	81,172	11,488	48,493	73,961	1,082	5,572
APR	1978	221.04	45,863	-3,746	158,556	42	28,756	0	144,776	47,334	74	-1,084
	1977	220.24	43,777	-9,819	8,402	74,019	3,622	35,623	5,779	54,682	821	1,043
MAY	1978	218.50	39,324	-6,539	72,682	1,381	42,684	0	10,085	113,222	2,660	-2,681
	1977	221.55	47,204	3,427	51,341	4,548	55,368	6,639	48,073	56,750	221	3,853
JUNE	1978	219.38	41,557	2,233	142,891	31,566	181,832	0	7,480	345,276	3,319	-2,019
	1977	222.39	49,423	2,219	377	266,706	3,156	118,968	0	149,549	958	1,455
JULY	1978	219.42	41,660	103	30,257	233,238	188,513	9,619	0	438,920	4,503	-1,137
	1977	217.55	36,972	-12,451	0	358,852	3,496	172,285	0	199,117	1,550	-1,847
AUG	1978	223.04	51,151	9,491	15,770	210,691	226,052	22,175	6,191	413,521	4,978	-3,843
	1977	219.10	40,837	3,865	10,045	261,363	1,346	113,127	0	156,974	1,315	2,527
SEP	1978	223.36	52,011	860	116,466	1,756	196,565	0	196,793	131,920	1,870	-16,656
	1977	218.60	39,576	-1,261	34,117	102,446	648	9,318	92,405	41,380	272	4,903
OCT	1978	220.84	45,341	-6,670	79,649	87	121,373	10,923	42,071	160,000	897	-6,112
	1977	218.44	39,174	-402	4,735	69,957	0	46,715	0	30,815	84	2,520
NOV	1978	221.42	46,862	1,521	172,065	58	125,835	0	120,325	189,711	73	-13,672
	1977	220.92	45,549	6,375	82,399	1,287	43,581	1,131	99,108	23,647	205	3,199
DEC	1978	223.47	52,306	5,444	201,009	0	155,390	0	82,538	269,328	348	-1,259
	1977	224.34	54,647	9,098	130,908	0	213,995	0	297,172	56,131	201	17,699
TOTAL	1978	--	--	-2,341	1,695,664	478,819	2,079,369	42,717	2,018,498	2,317,567	18,975	-141,559
	1977	--	--	8,337	633,004	1,143,671	701,756	515,736	934,034	1,072,477	7,260	59,413

SAN LUIS RESERVOIR MONTHLY OPERATION

In acre-feet unless noted

Month	Year	Reservoir Storage			Inflow	Outflow			Gain (+) Loss (-) (Computed)	Evaporation	Prec. In Inches
		Water Surface Elevation in feet	Storage	Monthly Storage Change	San Luis P-G Plant Pumping	San Luis P-G Plant Generation	Pacheco Tunnel (Future Facility)				
January	1978	463.44	1,108,497	545,288	579,360	0			34,072	978	3.91
	1977	462.65	1,100,328	250,652	271,177	18			20,507	631	0.83
February	1978	509.49	1,617,913	509,416	539,387	0			29,971	1,551	4.20
	1977	468.92	1,165,701	65,373	71,827	0			-6,454	1,916	0.22
March	1978	531.17	1,879,432	261,519	289,492	0			27,973	3,132	4.48
	1977	472.50	1,203,584	37,883	48,493	4,475			-6,135	4,764	0.55
April	1978	542.06	2,015,903	136,471	144,776	42			8,263	4,365	1.42
	1977	465.80	1,133,015	-70,569	5,779	74,019			-2,329	8,258	0.00
May	1978	542.26	2,018,441	2,538	10,085	1,381			6,166	10,423	0.00
	1977	469.25	1,169,178	36,163	48,073	4,548			-7,362	7,014	1.39
June	1978	539.84	1,987,818	-30,623	7,480	31,566			6,537	12,373	0.09
	1977	443.16	905,233	-263,945	0	266,706			2,761	10,840	0.24
July	1978	520.74	1,751,944	-235,874	0	233,238			2,636	13,553	0.00
	1977	403.66	552,297	-352,936	0	358,852			5,916	11,363	0.00
August	1978	502.96	1,541,758	-210,186	6,191	210,691			5,686	13,194	0.00
	1977	368.06	292,948	-259,349	0	261,363			2,014	7,450	0.00
Sept.	1978	517.99	1,718,852	177,094	196,793	1,756			17,943	7,704	0.25
	1977	365.08	274,178	-18,770	92,405	102,446			-8,729	4,913	0.18
October	1978	520.78	1,752,427	33,575	42,071	87			8,409	6,153	0.00
	1977	352.91	202,802	-71,376	0	69,957			-1,419	3,050	0.05
November	1978	528.98	1,852,392	99,965	120,325	58			20,302	2,007	2.13
	1977	368.05	292,884	90,082	99,108	1,287			-7,739	1,571	0.20
December	1978	534.92	1,926,052	73,660	82,538	0			8,878	1,285	0.39
	1977	405.00	563,209	270,325	297,172	0			26,847	871	2.59
Total	1978		--	1,362,843	2,018,498	478,819			176,836	76,718	16.87
	1977		--	-286,467	934,034	1,143,671			-35,816	62,641	6.25


SAN LUIS RESERVOIR OPERATION
CAPACITY = 2,038,771 A.F.
STORAGE IN THOUSANDS OF ACRE-FEET
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
TOTAL STORAGE
STATE STORAGE
STATE INFLOW
1967
68
69
70
71
72
73
74
75
76
77
78

PYRAMID LAKE
MONTHLY OPERATION

1978

Amounts in acre-feet unless noted

(From Preliminary Records)

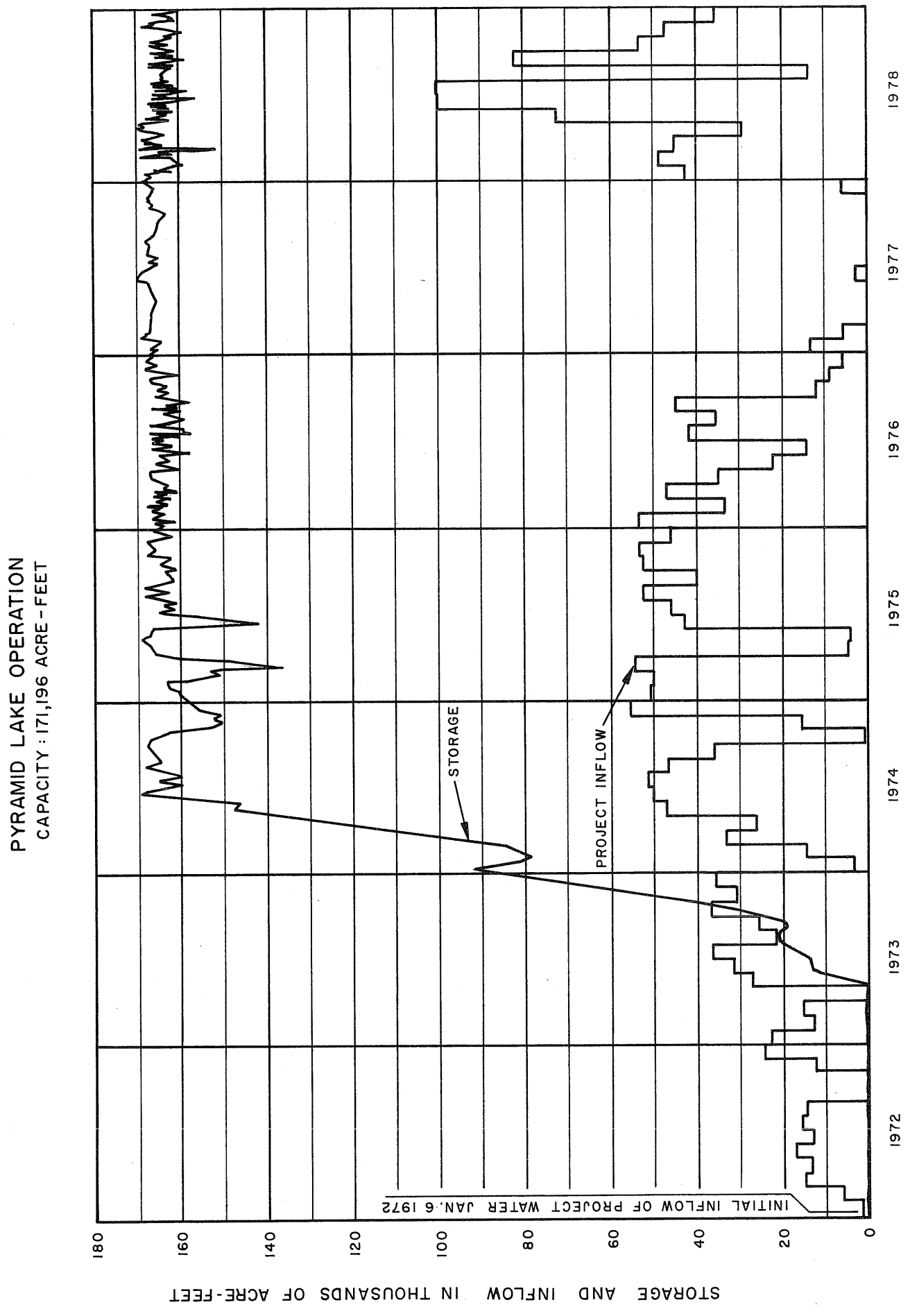
MONTH	WATER SURFACE ELEVATION	TOTAL STORAGE 1/	STORAGE CHANGE	INFLOW			OUTFLOW					COMPUTED LOSSES (-) GAINS (+)
				NATURAL	PROJECT		ANGELES TUNNEL	TO PIRU CREEK				
					GORMAN CREEK	PUMPBACK 2/		NATURAL INFLOW RELEASE 3/				
JAN	2,572.72	(-1,579) 163,174	-4,593	7,538	32,850	9,860	43,646	10,975				-220
FEB	2,573.4	(15,295) 164,031	857	38,128	48,281	402	65,528	21,254				828
MAR	2,576.25	(16,633) 167,652	3,621	48,678	44,676	203	42,802* 53,254	4,538				10,658
APR	2,577.83	(30,860) 169,682	2,030	15,638	0	28,969	42,059	1,411				893
MAY	2,574.99	(33,449) 166,045	-3,637	6,463	19,083	53,224	76,605	3,874				-1,928
JUN	2,571,70	(31,707) 161,895	-4,150	2,547	34,089	64,795	98,010	4,289				-3,282
JUL	2,574.32	165,194	3,299	1,309	17,279	82,951	92,831	1,333				-4,076
AUG	2,574.41	165,308	114	802	1,500	11,899	10,392	1,547				-2,148
SEP	2,575.72	166,975	1,667	897	1,624	80,837	75,810	1,232				-4,649
OCT	2,574.22	165,067 (704)	-1,908	823	23,355	29,610	53,089	1,178				-1,429
NOV	2,575.77	167,039 (-668)	1,972	1,192	44,885	2,319	43,334	1,196				-1,894
DEC	2,570.85	160,834	-6,205	1,635	35,060	521	39,722	3,007				-692
TOTAL			-6,933	125,650	302,682	365,590	737,082	55,834				-7,939

1/ Natural inflow storage shares shown in brackets

2/ Pumpback by Los Angeles Department of Water and Power (LADWP) from Elderberry Forebay thru Castaic Powerplant.

3/ Portion of these amounts used to satisfy fishery enhancement agreement.

* Transfer of natural inflow to avoid spilling.


PYRAMID LAKE OPERATION
CAPACITY: 171,196 ACRE-FEET
STORAGE AND INFLOW IN THOUSANDS OF ACRE-FEET
180
160
140
120
100
80
60
40
20
0
1972
1973
1974
1975
1976
1977
1978
STORAGE
PROJECT INFLOW
INITIAL INFLOW OF PROJECT WATER JAN. 6 1972

ELDERBERRY FOREBAY
MONTHLY OPERATION
1978

Amounts in acre-feet unless noted (From Preliminary Records)

MONTH	WATER SURFACE ELEVATION IN FEET	TOTAL STORAGE	STORAGE CHANGE	INFLOW		OUTFLOW			COMPUTED LOSSES (-) GAINS (+)
				CASTAIC P.P. GENERATION	NATURAL	TO CASTAIC LAKE		PUMP-BACK TO PYRAMID LAKE. 1/	
						NATURAL	PROJECT		
JAN	1,521.90	(0) 24,638	2,058	43,646	3,700	4,433	29,872	9,860	-1,123
FEB	1,488.0	(0) 12,153	-12,485	65,528	16,709	16,709	59,591	402	-18,020
MAR	1,529.6	(0) 28,047	15,894	42,802* 53,254	25,895	42,802* 25,895	28,923	203	-8,234
APR	1,528.7	(0) 27,635	-412	42,059	5,162	5,162	11,080	28,969	-2,422
MAY	1,517.9	(0) 22,956	-4,679	76,605	2,134	2,134	25,739	53,224	-2,321
JUN	1,524.4	(0) 25,719	2,763	98,010	856	856	28,698	64,795	-1,754
JUL	1,519.5	(0) 23,622	-2,097	92,831	274	274	13,047	82,951	1,070
AUG	1,518.2	(77) 23,080	-542	10,392	77	0	0	11,899	888
SEP	1,516.7	(145) 22,463	-617	75,810	68	0	0	80,837	4,342
OCT	1,525.0	(0) 25,982	+3,519	53,089	64	209	19,765	29,610	-50
NOV	1,504.6	(0) 17,773	-8,209	43,334	370	370	48,739	2,319	-485
DEC	1,503.2	(0) 17,262	-511	39,722	861	861	38,831	521	-881
TOTAL			-5,318	737,082	56,170	99,705	304,285	365,590	-28,990

1/ Pumpback by Los Angeles Department of Water and Power (LADWP) thru Castaic Power Plant.

* Natural inflow to Pyramid in transit to Castaic.

CASTAIC LAKE
MONTHLY OPERATION

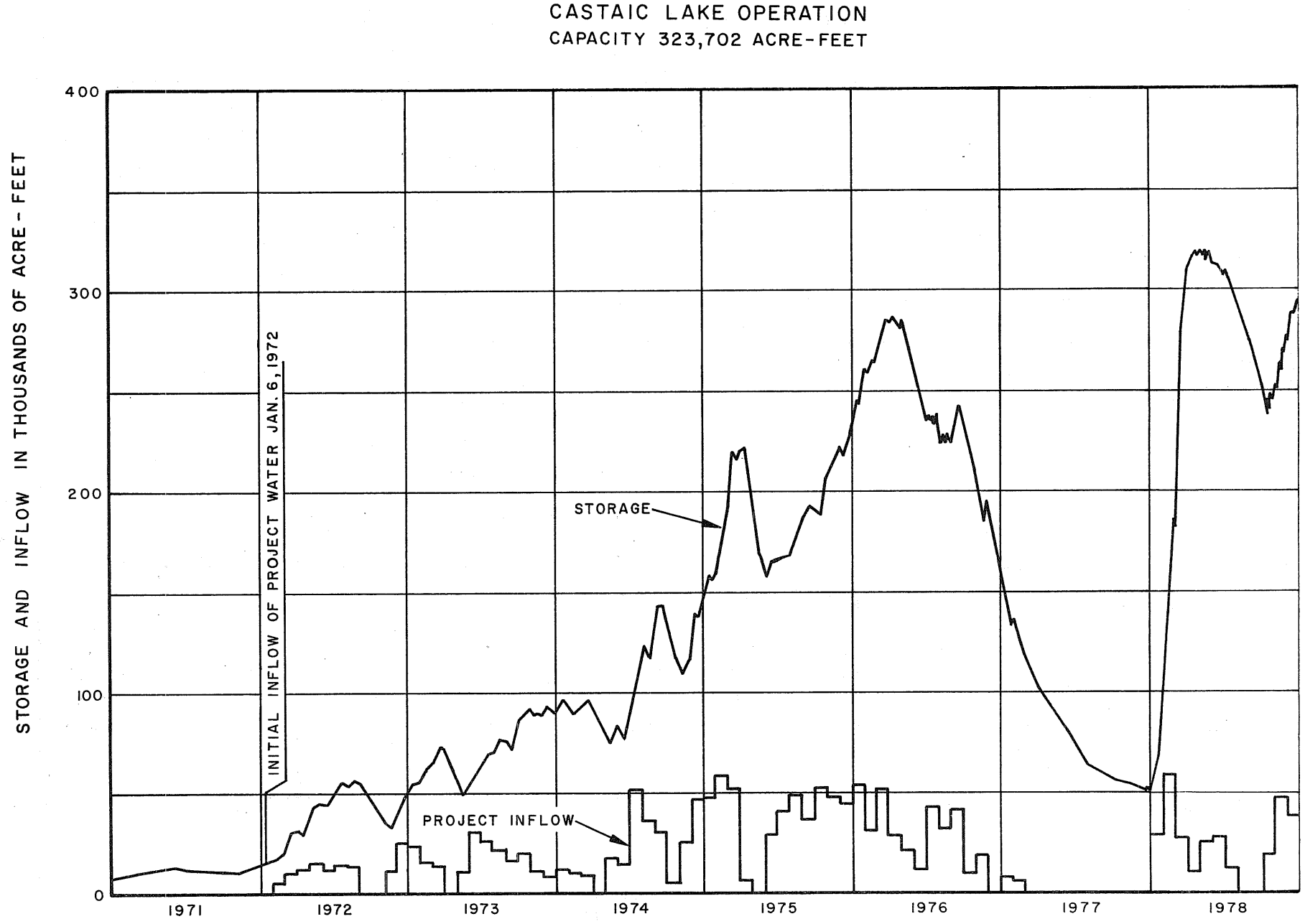
1978

Amount in acre-feet unless noted (From Preliminary Records)

MONTH	WATER SURFACE ELEVATION IN FEET	TOTAL STORAGE 1/	STORAGE CHANGE	INFLOW			OUTFLOW		DISPOSITION OF NATURAL INFLOW		COMPUTED LOSSES (-) GAINS (+)
				NATURAL	FROM ELDERBERRY FOREBAY		DELIVERIES	RELEASED TO CASTAIC AFTERBAY	RELEASED FROM CASTAIC AFTERBAY		
					NATURAL	PROJECT			SURFACE	SUB-SURFACE	
JAN	1,372.7	(5,119) 87,709	36,668	2,947	4,433	29,872	2,658	0	0	186	2,074
FEB	1,443.4	(32,453) 185,378	97,669	10,793	16,709	59,591	6,519	0	0	168	17,095
MAR	1,505.64	(121,996) 303,174	117,796	21,032	42,802* 25,895	28,923	4,405	0	0	186	3,549
APR	1,512,63	(132,289) 318,430	15,256	5,984	5,162	11,080	5,741	1,093	673	180	-136
MAY	1,510.67	(131,999) 314,108	-4,322	2,238	2,134	25,739	32,385	4,816	4,477	185	2,768
JUN	1,508.5	(123,265) 309,364	-4,744	1,000	856	28,698	27,645	10,732	10,411	179	3,079
JUL	1,501.4	(-114)** 294,133	-15,231	454	274	13,047	24,626	6,067	5,793	184	1,687
AUG	1,492.92	(-599) 276,542	-17,591	190	0	0	15,987	594	491	184	-1,200
SEP	1,480.93	(10,446)*** 252,694	-23,848	229	0	0	23,021	948	448	178	-108
OCT	1,478.12	(7,333) 247,272	-5,422	162	209	19,765	21,650	3,580	3,300	184	-328
NOV	1,491.90	(2,760) 274,468	+27,196	374	370	48,739	17,556	5,409	5,137	180	+678
DEC	1,501.41	(-546) 294,154	19,686	665	861	38,831	16,935	4,831	4,648	184	1,095
TOTAL			243,113	46,068	99,705	304,285	199,128	38,070	35,378	2,178	30,253

1/ Natural inflow storage shares shown in brackets. *** Agreement changed allowed 11,442 AF additional.

* From Pyramid ** Released 21,000 AF from May 1 thru 1200 July 23. Remaining storage plus inflow during period going to DWR as per agreement. (-114) represents over release since 1200 July 23.


CASTAIC LAKE OPERATION
CAPACITY 323,702 ACRE-FEET
STORAGE AND INFLOW IN THOUSANDS OF ACRE-FEET
400
300
200
100
0
INITIAL INFLOW OF PROJECT WATER JAN. 6, 1972
STORAGE
PROJECT INFLOW
1971
1972
1973
1974
1975
1976
1977
1978

SILVERWOOD LAKE
MONTHLY OPERATION

1978

Amounts in acre-feet unless noted

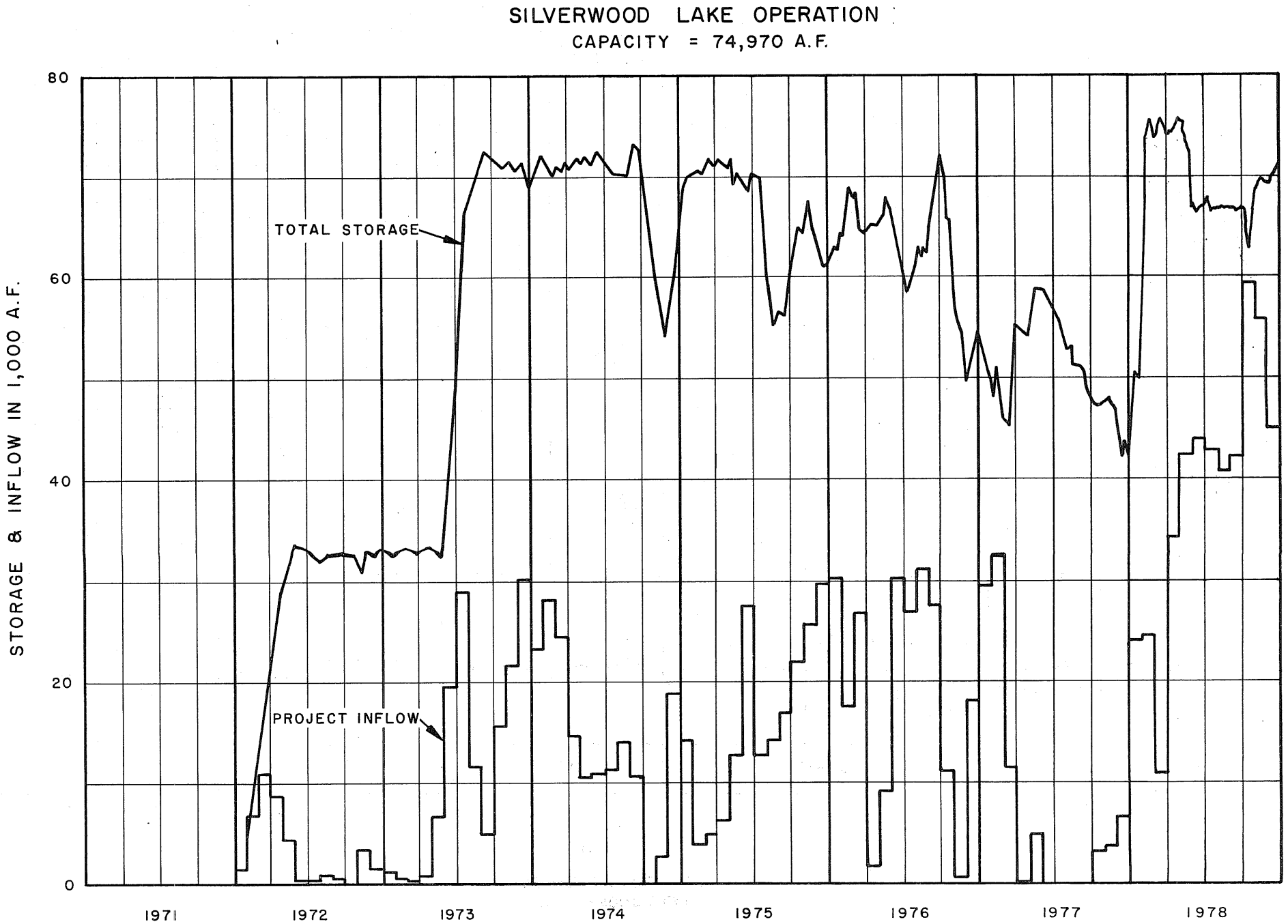
(From Preliminary Records)

MONTH	WATER SURFACE ELEVATION IN FEET	STORAGE 1/	STORAGE CHANGE	INFLOW		OUTFLOW			COMPUTED LOSSES	EXCHANGE OF NATURAL INFLOW 2/
				NATURAL	PROJECT	SAN BERNARDINO TUNNEL	AT TURNOUT (CLAWA)	NATURAL INFLOW TO MOJAVE RIVER		
JAN	3,339.53	(1,147) 60,690	18,200	6,979	24,117	8,462	85	4,930	581	5,820
FEB	3,350.61	(2,533) 70,751	10,061	17,575	24,625	16,425	79	15,479	-156	16,189
MAR	3,352.38	(4,379) 72,436	1,685	30,374	11,144	11,250	88	27,888	-607	28,528
APR	3,353.32	(1,784) 73,339	903	10,729	33,896	32,837	60	12,328	1,503	13,324
MAY	3,342.77	(0) 63,548	-9,791	3,826	14,113* 28,430	39,239	79	14,113* 4,685	1,956	5,610
JUN	3,341.95	(144) 62,818	-730	1,308	10,155* 33,747	36,711	121	10,155* 414	1,461	1,164
JUL	3,344.52	(75) 65,121	2,303	435	43,038	41,332	137	20	319	504
AUG	3,345.08	(36) 65,628	507	129	40,929	40,819	147	19	434	168
SEP	3,342.15	(91) 62,996	-2,632	369	42,664	45,523	100	18	-24	314
OCT	3,343.80	(-76) 64,471	+1,475	153	58,967	57,433	115	19	-78	320
NOV	3,349.13	(120) 69,360	+4,889	770	55,889	51,283	85	19	-383	574
DEC	3,351.15	(483) 71,263	1,903	2,016	46,475	47,846	130	1,005	2,393	1,653
TOTAL			28,773	74,663	468,189	429,160	1,226	91,092	7,399	98,436

1/ Natural inflow storage shares are shown in brackets.

2/ Releases made from Mojave Siphon to Los Flores Ranch Co. and to Mojave River from outlet to Mjoave W.A. in exchange for natural inflow stored in lake.

* Project water to conjunctive use program. Includes 584 ac-ft for repayment of water borrowed during construction (Contract #).


SILVERWOOD LAKE OPERATION
CAPACITY = 74,970 A.F.
STORAGE & INFLOW IN 1,000 A.F.
80
60
40
20
0
TOTAL STORAGE
PROJECT INFLOW
1971
1972
1973
1974
1975
1976
1977
1978

LAKE PERRIS
MONTHLY OPERATION

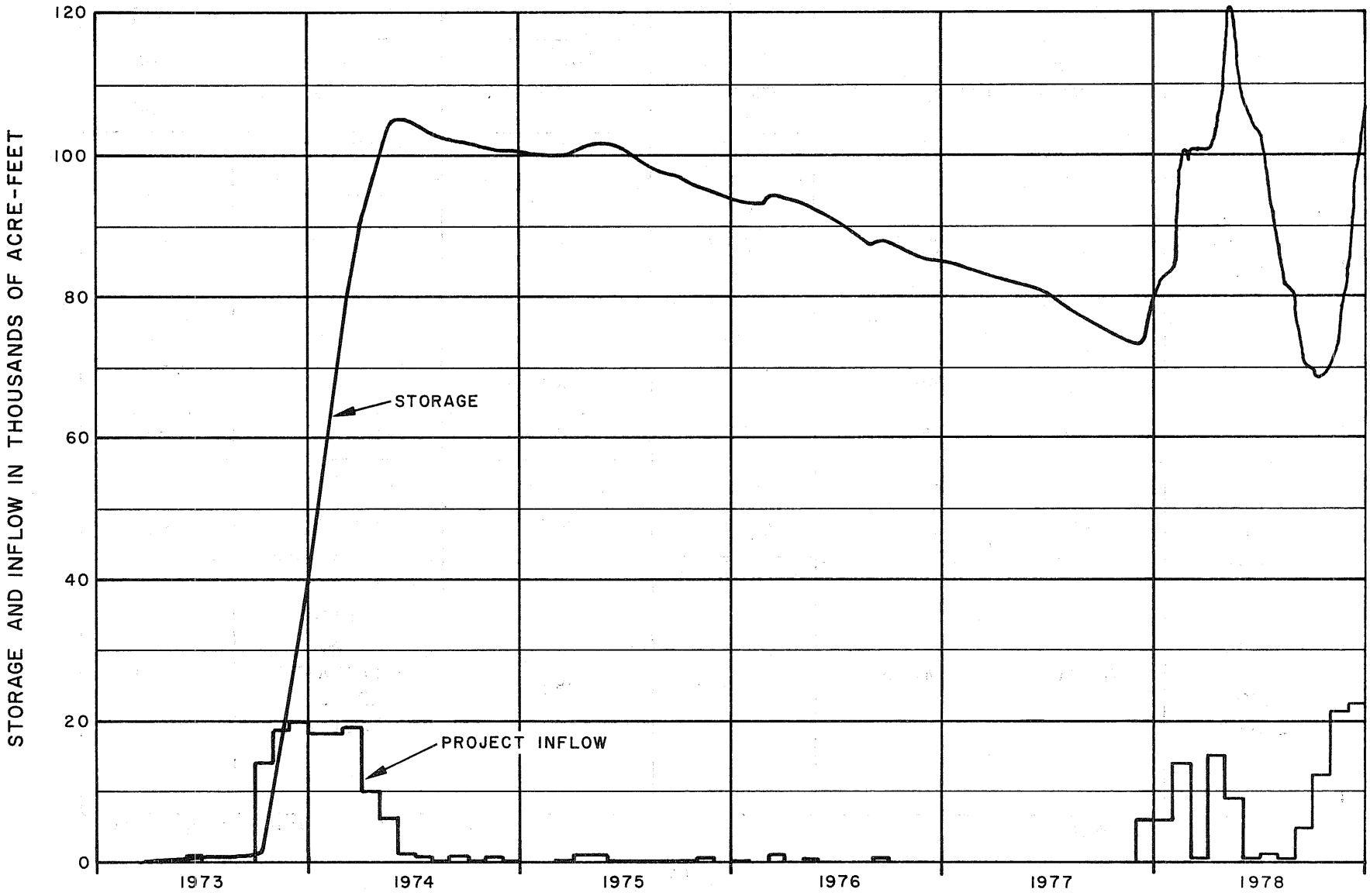
1978

Amounts in acre-feet unless noted (From Preliminary Records)

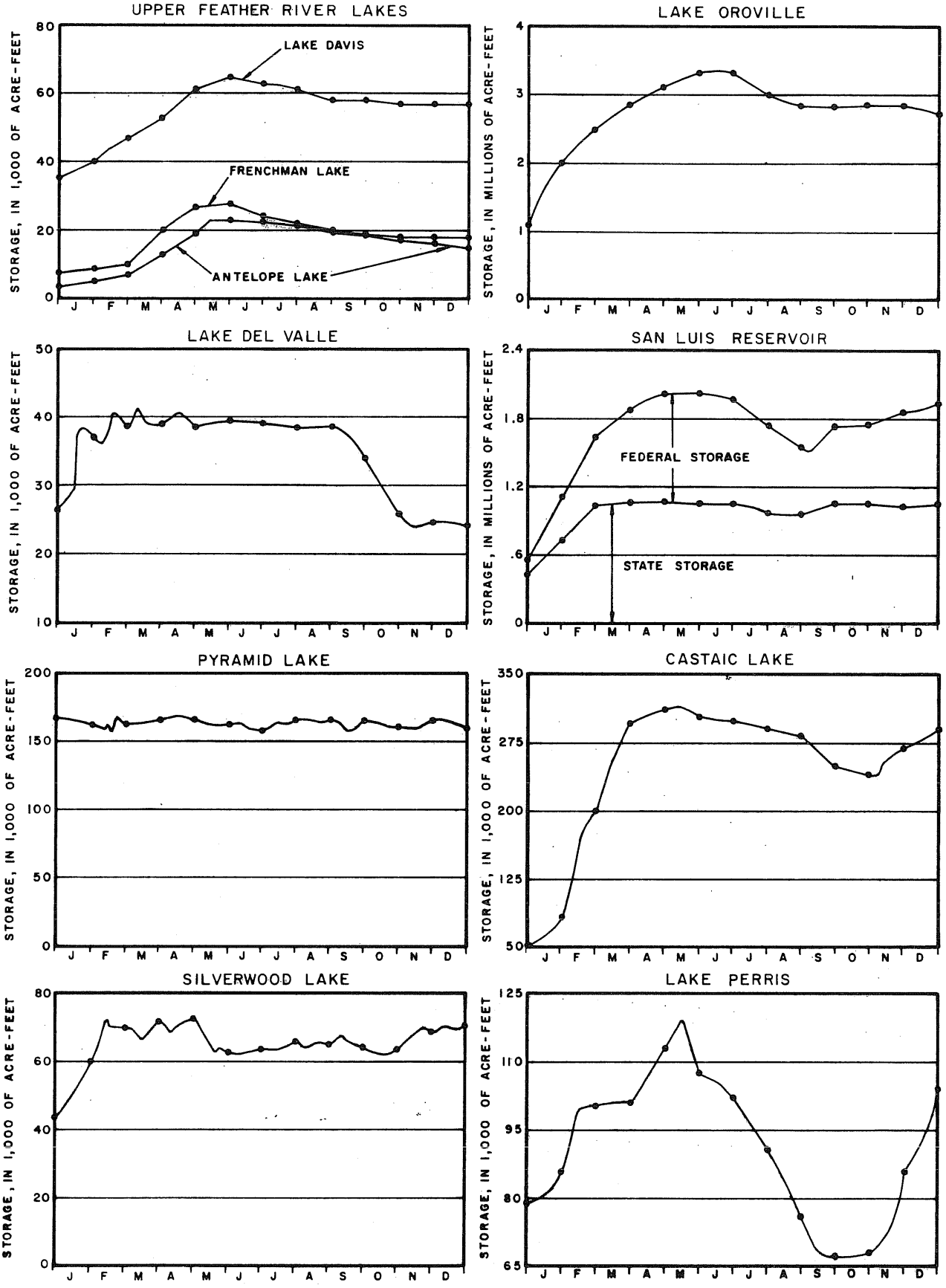
MONTH	WATER SURFACE ELEVATION IN FEET	TOTAL STORAGE	STORAGE CHANGE	INFLOW	OUTFLOW	COMPUTED LOSSES (-) GAINS (+)
JAN	1,568.82	85,747	6,525	6,168	194	551
FEB	1,575.86	100,168	14,431	13,742	208	887
MAR	1,575.95	100,358	190	394	241	37
APR	1,582.54	114,563	14,205	15,089	235	-649
MAY	1,579.84	108,663	-5,900	8,991	12,767	-2,124
JUN	1,577.31	103,235	-5,428	433	3,657	-2,204
JUL	1,571.10	90,330	-12,905	1,572	12,617	-1,860
AUG	1,564.05	76,465	-13,865	166	12,647	-1,384
SEP	1,560.00	68,925	-7,540	5,073	12,203	-410
OCT	1,560.54	69,910	+985	12,285	12,630	+1,330
NOV	1,569.21	86,525	16,515	21,879	6,928	1,664
DEC	1578.83	106,482	19,957	22,205	2,597	349
TOTAL			27,260	107,999	76,992	-3,747

LAKE PERRIS OPERATION

CAPACITY 131,452 ACRE-FEET



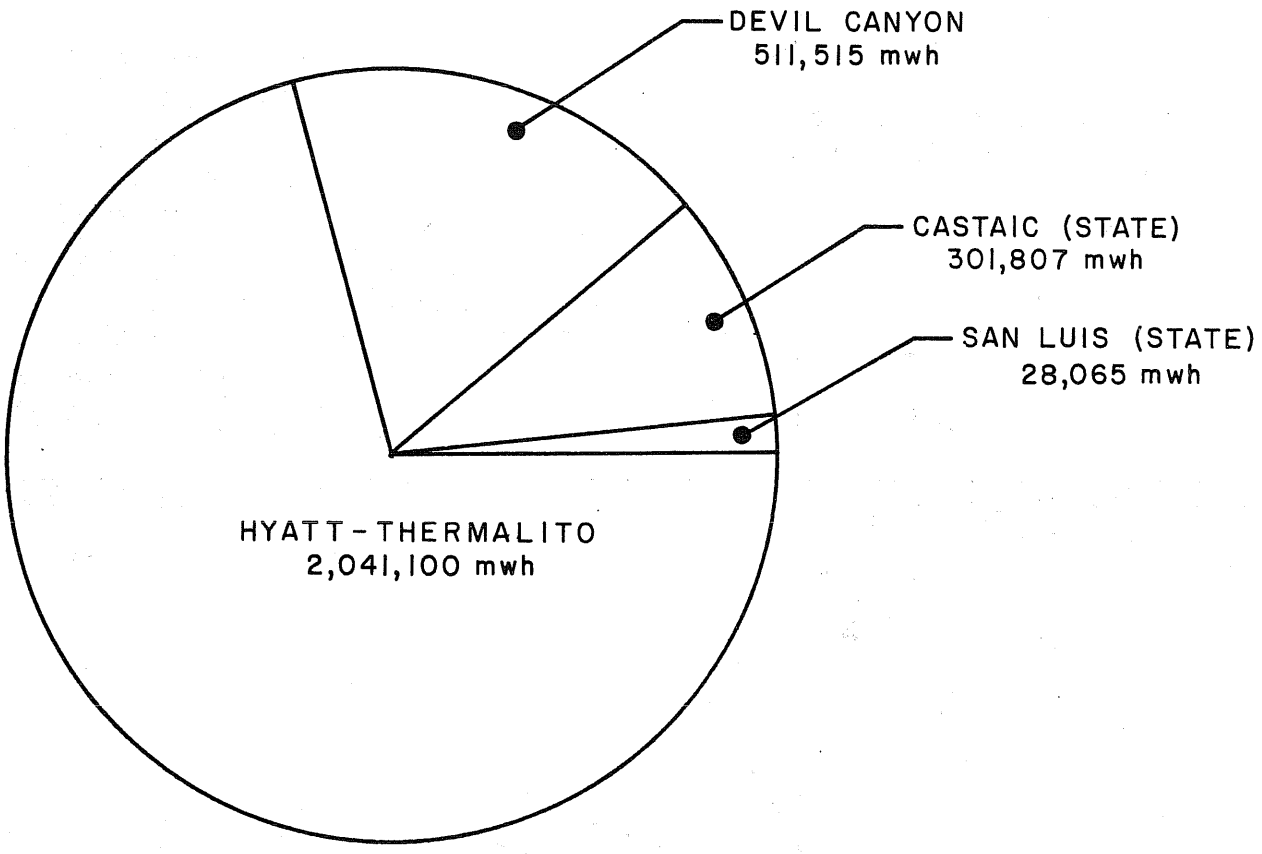
PROJECT RESERVOIRS
1978



POWER SUPPLY & USE

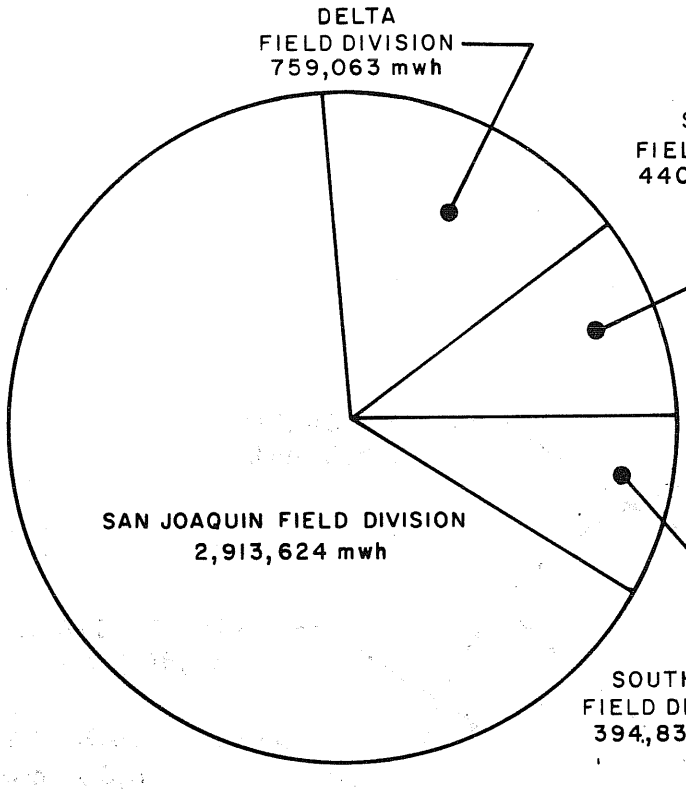
SECTION VI

PROJECT GROSS POWER GENERATION
1978



PROJECT POWER OPERATIONS 1/

(STATE ONLY)
1978



ENERGY USED*

PUMPING PLANTS

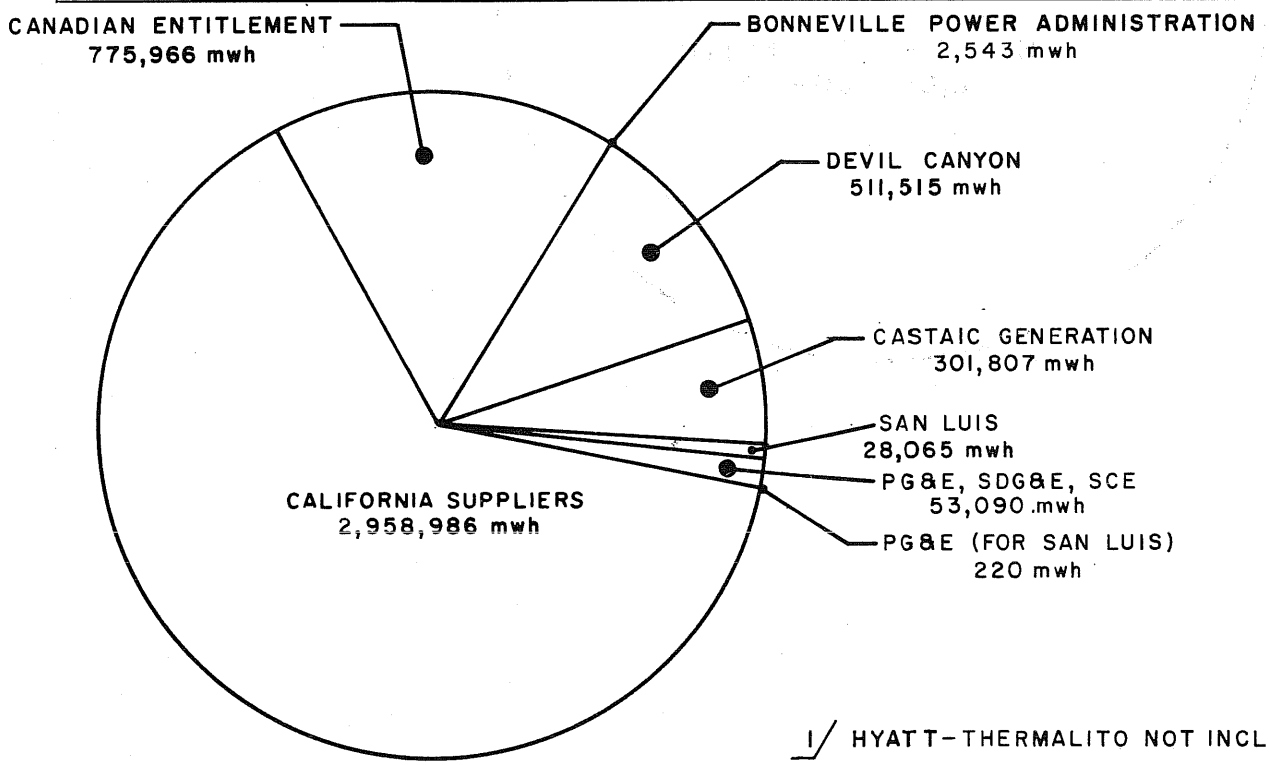
DELTA FIELD DIVISION
1. CORDELIA
2. DELTA
3. SOUTH BAY
4. DEL VALLE

SAN LUIS FIELD DIVISION
1. SAN LUIS
2. DOS AMIGOS

SAN JOAQUIN FIELD DIVISION
1. LAS PERILLAS
2. BADGER HILL
3. BUENA VISTA
4. WHEELER RIDGE
5. WIND GAP
6. A. D. EDMONSTON

SOUTHERN FIELD DIVISION
1. OSO
2. PEARBLOSSOM

* Not included are Devil Canyon Powerplant station service and states share of power to pump waterfowl mitigation water at Tracy Pumping Plant

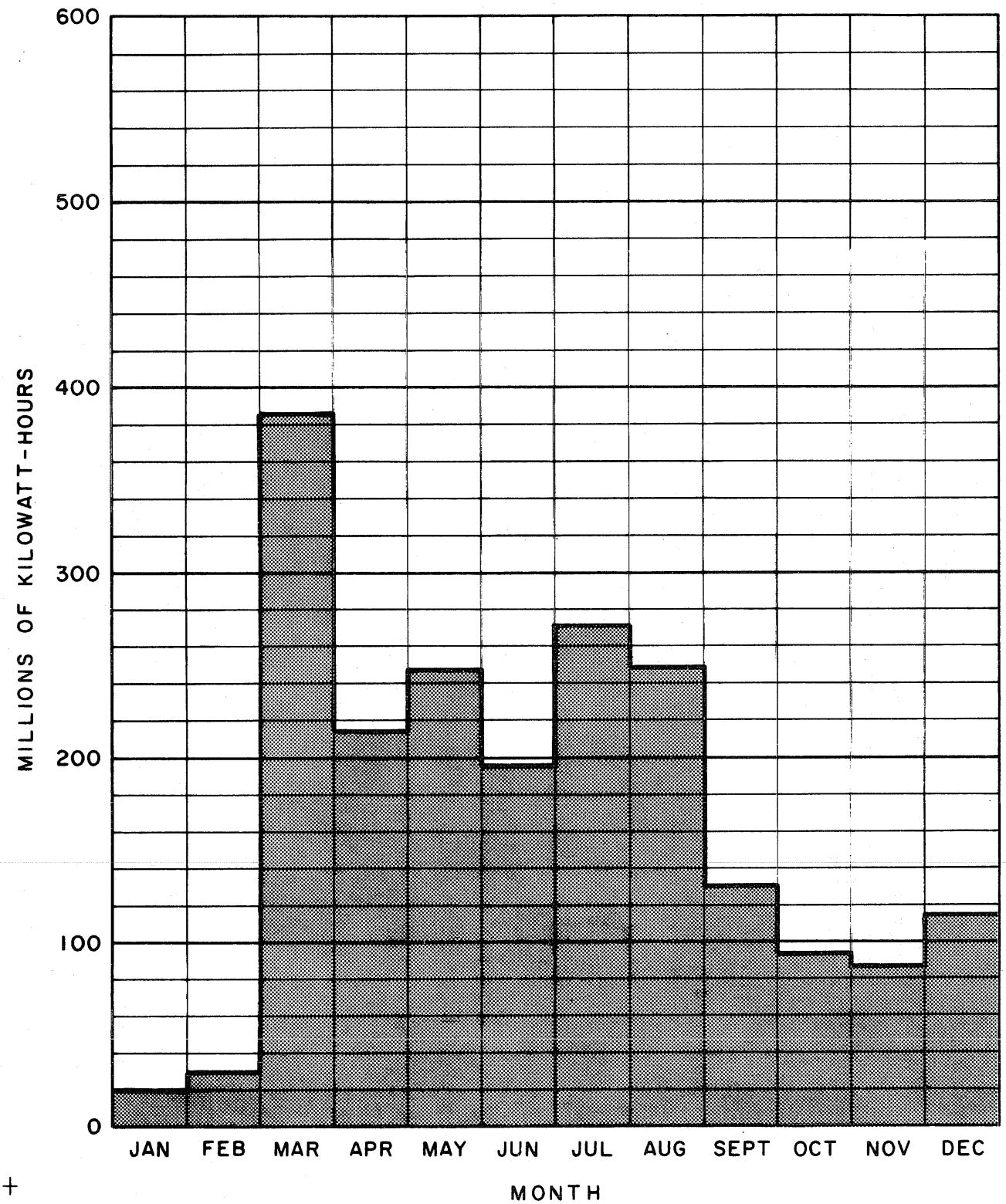


ENERGY SOURCES

1/ HYATT-THERMALITO NOT INCLUDED.

GROSS GENERATION AT HYATT AND THERMALITO POWERPLANTS

1978

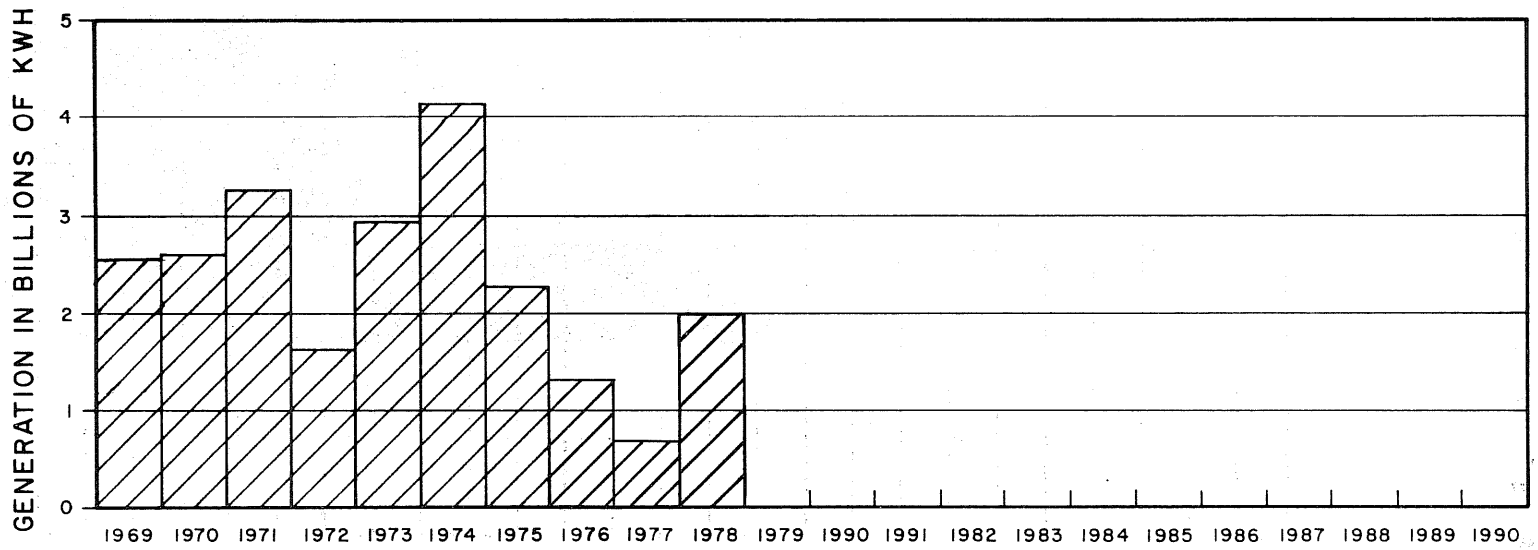


OPERATION OF EDWARD HYATT & THERMALITO POWERPLANTS

1978

ENERGY IN MILLIONS OF KWH

OPERATIONS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
ENERGY GENERATED BY EDWARD HYATT AND THERMALITO POWERPLANTS													
GROSS GENERATION	19.94	31.97	386.40	215.74	246.24	195.88	271.71	247.45	129.38	94.42	86.15	115.82	2,041.10
POWERPLANT USE AND PUMPBACK REQUIREMENTS	9.38	8.37	1.13	21.88	7.48	6.14	3.38	3.60	4.41	3.42	11.88	21.13	102.20
DELIVERED TO CALIFORNIA POWER POOL COMPANIES	10.56	23.60	385.27	193.86	238.76	189.74	268.33	243.85	124.97	91.00	74.27	94.69	1,938.90



PROJECT POWER SUPPLY
1978

(In megawatt hours)

SOURCE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
San Luis Generation													
State Share	0	0	0	12	0	2,718	20,328	4,978	0	16	13	0	28,065
Federal Share	0	0	0	0	0	4,884	43,804	49,689	148	0	0	0	98,525
Total	0	0	0	12	0	7,602	64,132	54,667	148	16	13	0	126,590
Castaic													
State Share	29,568	54,294	43,934	4,704	18,240	28,800	15,360	960	2,400	22,715	44,592	36,240	301,807
Devil Canyon	9,875	19,895	13,722	39,386	46,569	43,461	48,986	48,493	53,923	68,299	61,476	57,430	511,515
Bonneville Power Administration	0	0	0	0	677	344	1,522	0	0	0	0	0	2,543
Canadian Entitlement	108,856	98,120	108,107	50,007	51,606	50,191	52,352	52,493	50,734	51,706	49,943	51,852	775,967
Suppliers	290,553	311,751	120,350	76,980	192,151	336,039	278,194	237,042	217,126	289,578	315,599	293,622	2,958,985
PGandE, SDG&E and SCE 1/	53,090	0	0	0	0	0	0	0	0	0	0	0	53,090
PGandE for San Luis Generation 2/	0	0	0	0	0	0	220	0	0	0	0	0	220

1/ For pumping 30,000 ac-ft of Colorado River water by MWDSC.

2/ For pumping Colorado River water in State water exchange program.

PROJECT POWER USE
1978

(In megawatt hours)

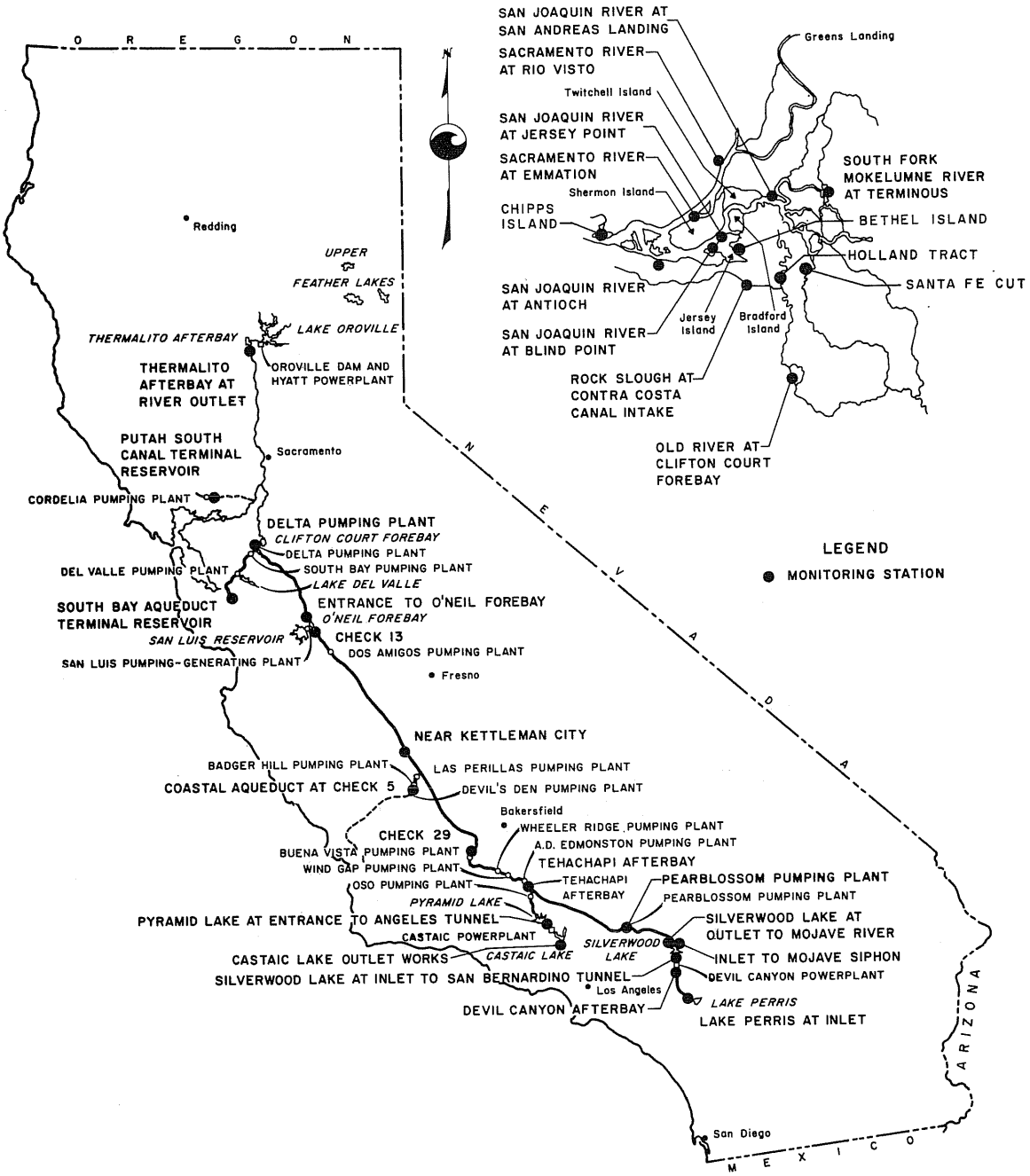
PUMPING PLANT	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
Cordelia	167	149	186	156	400	283	200	303	312	332	338	281	3,107
Tracy for State	0	0	296[1]	0	0	0	0	0	0	0	0	0	296
Delta for State	110,172	103,657	32,805	10,022	17,867	58,755	63,360	72,965	63,547	38,406	40,842	51,559	663,957
for Federal	0	0	0	768	0	1,951	570	1,346	0	85	0	0	4,720
South Bay	2,740	276	3,378	4,349	9,666	11,931	14,848	13,833	7,729	5,934	7,693	9,472	91,849
Del Valle	21	16	16	13	11	8	10	12	12	9	11	11	150
San Luis for State	83,925	94,145	19,686	2,745	2	6	6	1,970	34,608	96	77	12,609	249,875
for Federal	64,052	69,905	77,959	68,261	4,864	1,553	5	1	30,246	14,304	40,838	26,009	397,997
Dos Amigos for State	7,336	7,345	8,866	1,925	7,299	24,440	33,952	33,615	13,678	16,655	17,963	17,740	190,814
for Federal	380	1,235	2,988	4,487	8,078	22,823	26,573	23,307	3,697	4,470	7,436	18,406	123,880
Las Perillas	76	56	57	162	840	1,620	1,777	1,436	317	639	301	523	7,804
Badger Hill	119	68	80	362	2,241	4,152	4,659	3,718	786	1,714	735	1,387	20,021
Buena Vista	14,890	18,041	14,009	10,560	20,420	29,481	28,074	22,356	14,511	24,105	26,184	23,972	246,603
Wheeler Ridge	17,328	20,617	16,156	11,462	20,493	27,443	23,099	16,673	15,057	26,828	29,583	26,148	250,887
Wind Gap	38,570	46,284	35,980	24,569	44,159	58,511	48,031	34,408	32,690	59,235	65,584	5,601	493,622
A. D. Edmonston	136,485	163,375	126,834	86,717	150,890	204,116	163,855	114,302	111,493	209,806	231,197	195,617	1,894,687
Oso	9,349	13,162	12,156	101	4,470	9,793	5,042	0	0	7,137	12,078	10,124	83,412
Pearblossom	17,675	16,869	8,529	25,025	30,483	31,013	29,857	28,375	29,443	41,419	19,036	33,694	311,418
Devil Canyon (Station Service)	0	0	0	0	0	0	0	0	0	0	0	0	0
Julian Hinds[2] (MWDSC)	53,090	0	0	0	0	0	0	0	0	0	0	0	53,090

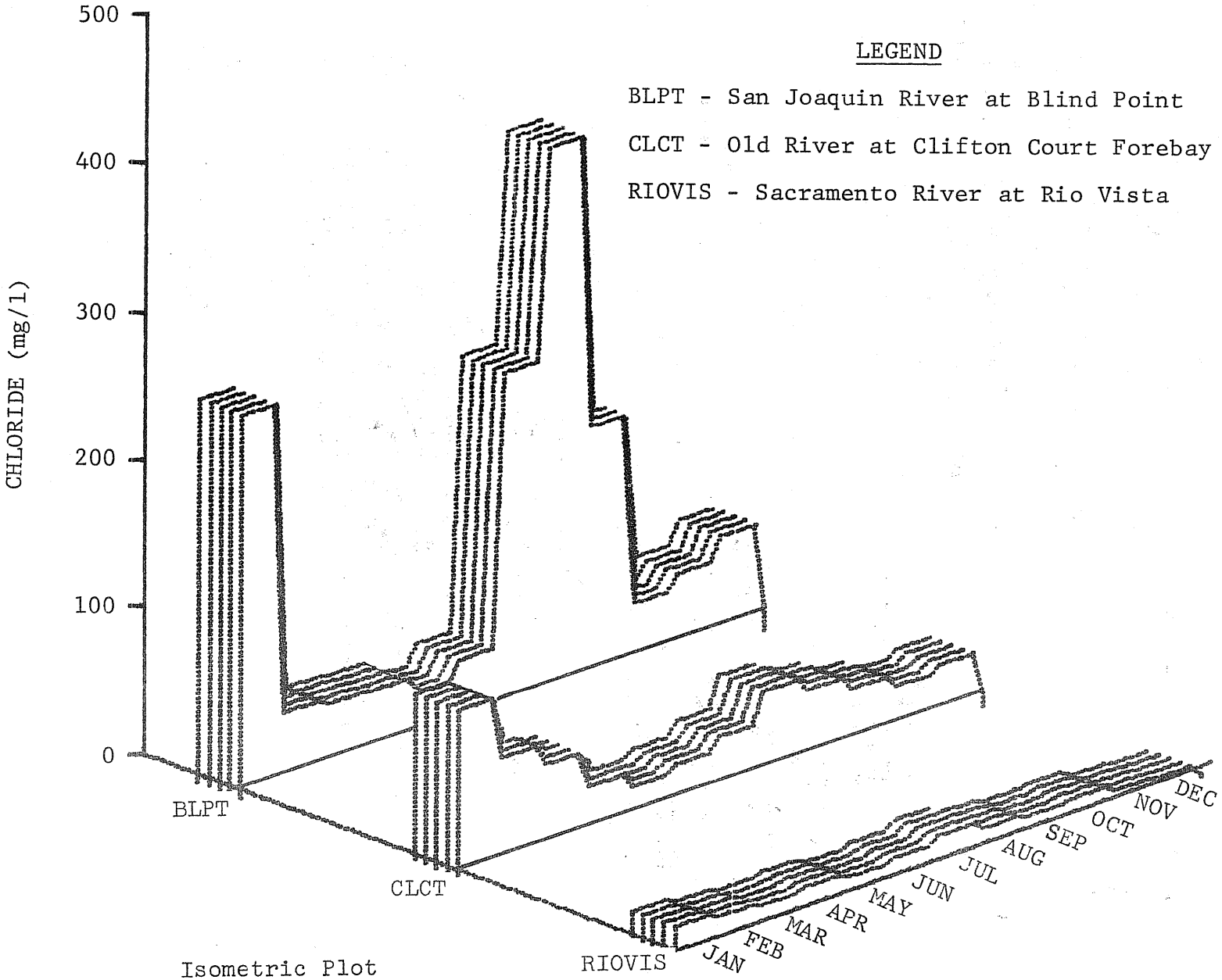
1/ Payback for mitigation water.
2/ For pumping Colorado River water by MWDSC in State water exchange program.

WATER QUALITY

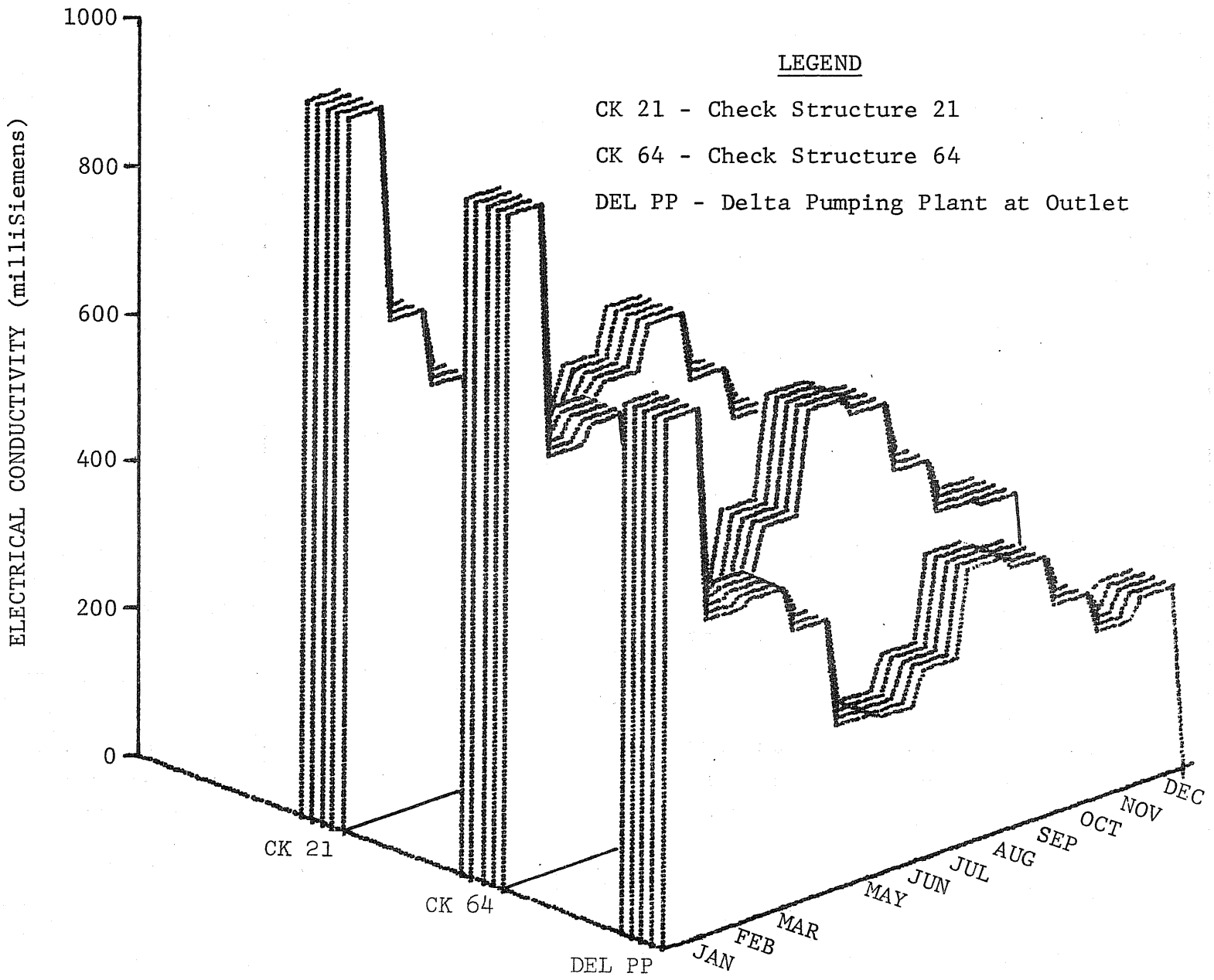
SECTION VII

WATER QUALITY MONITORING STATIONS





Isometric Plot
of
Chlorides at Delta Stations
1978



Isometric Plot
of
Monthly EC at SWP Locations
1978

WATER QUALITY
THERMALITO AFTERBAY AT FEATHER RIVER OUTLET

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	52	68	54	59	59	47	55	48	49	56	54	52	54
Total Hardness (mg/l)	b	42	41	35	32	30	32	30	31	32	31	33	36	34
Chlorides (mg/l)	b	3.4	2.0	2.7	1.7	1.1	1.3	2.0	1.2	0.8	1.7	1.2	1.6	1.7
Sulfates (mg/l)	b	3.0	1.3	2.0	0.0	0.3	2.7	0.0	0.3	0.2	0.6	0.0	0.0	1.1
Sodium (%)	b	21	21	22	19	15	16	17	19	17	18	19	20	19
Boron (mg/l)	b	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
pH	c	6.6	7.3	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.1	7.2	7.18
Electrical Conductivity (Micromhos)	b	111	103	91	82	77	73	74	86	77	76	80	87	84
Sampling Date		1/18	2/15	3/15	4/19	5/15	6/21	7/19	8/16	9/20	10/18	11/15	12/20	

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.

WATER QUALITY
PUTAH SOUTH CANAL TERMINAL RESERVOIR
(INFLOW TO NORTH BAY AQUEDUCT)

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	134	223	315	265	197	181	180	185	173	182	198	198	203
Total Hardness (mg/l)	b	100	153	176	177	148	156	155	153	157	158	159	165	155
Chlorides (mg/l)	b	8.2	17	24	14	7.2	6.0	5.7	6.6	6.0	6.6	7.1	7.5	9.7
Sulfates (mg/l)	b	18	43	78	51	22	19	18	19	20	20	20	20	29
Sodium (%)	b	19	25	34	24	13	26.5	12	14	12	12	13	14	17
Boron (mg/l)	b	0.2	0.3	0.5	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.0	0.2
pH	c	7.6	8.0	8.8	8.6	7.4	8.4	8.5	8.2	8.9	8.4	8.8	9.7	8.86
Electrical Conductivity (Micromhos)	b	253	401	524	451	329	322	317	322	320	321	328	346	353
Sampling Date		1/16	2/14	3/14	4/18	5/16	6/20	7/18	8/15	9/19	10/17	11/14	12/19	

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.

WATER QUALITY
CALIFORNIA AQUEDUCT AT DELTA PUMPING PLANT

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	402	262	253	217	130	126	152	220	209	169	137	153	203
Total Hardness (mg/l)	a	125	98	96	88	65	64	71	88	86	76	67	72	83
Chlorides (mg/l)	a	129	65	62	48	22	20	28	49	46	33	23	28	46
Sulfates (mg/l)	a	55	43	41	35	18	17	22	35	33	25	19	22	30
Sodium (mg/l)	a	86	48	46	38	19	18	24	38	36	27	20	24	35
Sodium (%)	a	60	52	51	48	39	38	42	49	48	44	40	42	46
Elect. Cond. (Micromhos)	a	711	424	433	371	224	216	261	376	358	290	235	262	347
Elect. Cond. (Micromhos)	b	637	514	506	353	232	215	256	396	372	288	228	268	355
pH	c	7.8	7.7	7.8	8.0	7.6	8.0	7.8	7.8	8.4	7.8	8.2	7.8	7.95
Boron (mg/l)	b	0.2	0.2	0.4	0.3	0.2	0.1	0.2	0.1	0.0	0.2	0.1	0.0	0.2
Fluoride (mg/l)	b	0.2	0.2	0.3	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.02	0.02	0.01	0.01	0.01	0.02	0.00	0.01	0.00	0.01	0.02	0.01	0.01
Hexavalent Chromium (mg/l)	b d		0.00							0.00				0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Iron (mg/l)	b	0.05	0.02	0.04	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.02
Manganese (mg/l)	b	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.06	0.03	0.03	0.06	0.02	0.03
Magnesium (mg/l)	b	19	18	14	10	7.5	9.0	7.5	12	13	11	6.9	8.0	11
Copper (mg/l)	b	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.01
Calcium (mg/l)	b	24	24	24	14	7.7	7.7	14	11	13	12	13	16	15
Zinc (mg/l)	b	0.01	0.00	0.04	0.02	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	.01
Phenol (mg/l)	b d		0.000							0.000				
Color (units)	b	50	50	40	25	35	35		25	15	25	25	20	31
Sampling Date		1/18	2/15	3/15	4/19	5/17	6/21	7/19	8/16	9/20	10/18	11/15	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
SOUTH BAY AQUEDUCT TERMINAL RESERVOIR

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	398	308	268	220	150	127	150	221	210	223	165	151	216
Total Hardness (mg/l)	a	131	121	108	93	71	63	71	93	90	94	76	71	90
Chlorides (mg/l)	a	121	73	62	49	30	23	30	49	46	50	34	30	50
Sulfates (mg/l)	a	51	53	45	36	23	19	23	36	34	36	26	23	34
Sodium (mg/l)	a	79	56	42	32	18	13	18	32	30	33	21	18	33
Sodium (%)	a	51	48	46	43	35	30	35	43	42	30	37	35	40
Elect. Cond. (Micromhos)	a	688	528	460	380	263	224	263	382	364	385	289	264	374
Elect. Cond. (Micromhos)	b	715	530	466	391	257	223	252	386	432	387	234	268	378
pH	c	8.1	7.8	7.9	8.4	7.3	7.8	7.8	7.4	8.0	8.2	8.6	7.8	8.07
Boron (mg/l)	b	0.2	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.15
Fluoride (mg/l)	b	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.16
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Selenium (mg/l)	b	0.01	0.01	0.01	0.00	0.02	0.01	0.02	0.00	0.01	0.00	0.02	0.01	0.01
Hexavalent Chromium (mg/l)	b d		0.00							0.00				0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.02	0.00	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Manganese (mg/l)	b	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.02	0.01	0.01
Magnesium (mg/l)	b	23	20	18	15	7.4	6.8	11	11	16	15	6.8	10	13.3
Copper (mg/l)	b	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.04	0.01
Calcium (mg/l)	b	27	27	27	16	9.4	12	8.5	12	26	24	14	12	18
Zinc (mg/l)	b	0.02	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.36	0.04
Phenol (mg/l)	b		0.001							0.001				0.001
Color (units)	d b	25	18	15	18	30	40	25	25	15	15	25	20	23
Sampling Date		1/17	2/14	3/14	4/18	5/16	6/21	7/18	8/15	9/19	10/17	11/14	21/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis on monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
CALIFORNIA AQUEDUCT ENTRANCE TO O'NEILL FOREBAY

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	411b	261	257	220	164	125	147	210	212	175	135	147	205
Total Hardness (mg/l)	a	138b	97	96	88	75	64	70	86	87	78	67	70	85
Chlorides (mg/l)	a	128b	65	64	49	30	19	25	46	46	34	22	25	46
Sulfates (mg/l)	a	62b	63	62	37	24	14	19	35	35	26	16	19	34
Sodium (mg/l)	a	82b	49	48	39	26	18	22	36	37	28	20	22	36
Sodium (%)	a	56b	52	52	49	43	38	41	48	48	44	39	41	46
Elect. Cond. (micromhos)	a	706b	440	447	382	282	214	252	364	367	301	231	252	353
Elect. Cond. (micromhos)	b	706	515	483	378	337	226	248	374	385	314	228	264	372
pH	c	7.7	7.8	7.8	8.4	7.9	7.4	7.6	7.6	8.6	7.8	8.4	8.2	8.09
Boron (mg/l)	b	0.2	0.2	0.3	0.3	0.3	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.15
Fluoride (mg/l)	b	0.1	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.14
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.02	0.02	0.01
Hexavalent Chromium (mg/l)	b d		0.00							0.00				0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.03	0.02	0.05	0.01	0.02	0.18	0.01	0.01	0.01	0.01	0.01	0.02	0.03
Manganese (mg/l)	b	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01
Magnesium (mg/l)	b	21	16	15	11	9.5	7.7	10	10	11	10	9.6	8.4	12
Copper (mg/l)	b	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.04	0.00	0.01	0.01
Calcium (mg/l)	b	21	27	23	16	12	9.9	9.5	13	15	14	9.0	15	15
Zinc (mg/l)	b	0.02	0.01	0.04	0.01	0.02	0.02	0.00	0.00	0.01	0.03	0.00	0.02	0.02
Phenol (mg/l)	b d		0.000							0.000				0.000
Color (units)	b	50	50	35	15	20	40	30	25	15	20	25	20	29
Sampling Date		1/18	2/15	3/15	4/19	5/17	6/21	7/19	8/16	9/20	10/18	11/15	12/20	

a - Weighted average resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
CALIFORNIA AQUEDUCT AT CHECK 13

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	374	290	259	186	161	157	254	290	228	198	163	197	230
Total Hardness (mg/l)	a	146	118	108	83	74	72	107	118	97	87	74	87	98
Chlorides (mg/l)	a	100	70	60	37	30	29	58	70	50	41	31	40	51
Sulfates (mg/l)	a	52	55	47	29	24	23	45	55	39	32	24	32	38
Sodium (mg/l)	a	73	54	47	31	26	25	46	54	40	34	26	33	41
Sodium (%)	a	52	50	48	45	44	43	48	50	47	46	44	46	47
Elect. Cond. (micromhos)	a	672	516	459	324	280	271	450	516	401	347	282	345	405
Elect. Cond. (micromhos)	b	953	516	451	300	288	278	450	573	398	348	267	314	428
pH	c	7.4	7.4	7.3	7.3	7.3	7.4	7.4	7.6	7.5	7.4	7.4	7.2	7.39
Boron (mg/l)	b	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.0	0.18
Fluoride (mg/l)	b	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.16
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.01
Hexavalent Chromium (mg/l)	b d		0.00							0.00				0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.02	0.02	0.08	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Manganese (mg/l)	b	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.01	0.02	0.01
Magnesium (mg/l)	b	25	15	14	10	7.5	11	14	16	13	12	8.0	9.4	13
Copper (mg/l)	b	0.02	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.02	0.02	0.02
Calcium (mg/l)	b	21	26	19	12	14	9.6	17	20	13	13	14	17	16
Zinc (mg/l)	b	0.03	0.01	0.02	0.01	0.01	0.03	0.01	0.00	0.01	0.00	0.01	0.01	0.01
Phenol (mg/l)	b d		0.000							0.000				0.000
Color (units)	b	30	50	50	35	25	30	20	20	15	20	30	25	29
Sampling Date		1/18	2/15	3/15	4/19	5/17	6/21	7/19	8/16	9/20	10/18	11/15	12/20	

a - Weighted average resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
CALIFORNIA AQUEDUCT NEAR KETTLEMAN CITY

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	437b	376	319	253	187	158	279	311	259	220	169	204	264
Total Hardness (mg/l)	a	180b	138	122	103	83	73	111	120	105	93	77	88	108
Chlorides (mg/l)	a	55b	103	81	58	37	29	67	78	60	47	32	42	57
Sulfates (mg/l)	a	167b	88	68	47	25	15	55	66	49	36	19	30	55
Sodium (mg/l)	a	74b	77	62	46	31	25	52	60	47	38	27	35	48
Sodium (%)	a		55	52	49	45	43	51	52	50	47	43	46	49
Elect. Cond. (micromhos)	a		669	563	443	325	272	491	549	455	384	292	354	436
Elect. Cond. (micromhos)	b	724	917	477	413	305	258	523	580	410	377	258	370	468
pH	c	8.1	8.4	7.8	8.7	8.2	7.7	7.7	7.8	8.4	8.0	7.7	7.7	8.15
Boron (mg/l)	b	0.3	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.0	0.23
Fluoride (mg/l)	b	0.3	0.3	0.3	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.18
Lead (mg/l)	b	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.02	0.00	0.01
Hexavalent Chromium (mg/l)	b d		0.00											0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.01	0.01	0.04	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.02	0.01	0.01
Manganese (mg/l)	b	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00
Magnesium (mg/l)	b	23	32	14	13	8.5	8.3	16	18	11	12	7.3	11	15
Copper (mg/l)	b	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01
Calcium (mg/l)	b	34	50	25	18	14	12	20	19	17	15	14	19	21
Zinc (mg/l)	b		0.02	0.02	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Phenol (mg/l)	b d		0.004							0.003				.0035
Color (units)	b	12	10	40	20	30	35	25	20	18	20	25	25	23
Sampling Date		1/18	2/15	3/15	4/19	5/16	6/21	7/19	8/16	9/20	10/18	11/15	12/20	

a - Weighted average resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
COASTAL BRANCH AQUEDUCT AT CHECK 5

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	643b	523	383	249	200	159	265	303	281	228	182	205	302
Total Hardness (mg/l)	a	175b	175	139	102	87	73	106	117	111	96	82	89	113
Chlorides (mg/l)	a	242b	174	109	57	41	29	63	77	69	50	36	43	83
Sulfates (mg/l)	a	69b	131	87	45	30	17	50	61	55	39	24	31	53
Sodium (mg/l)	a	154b	127	82	45	33	24	49	59	54	40	29	34	61
Sodium (%)	a	66b	61	56	49	45	42	50	52	51	48	44	46	51
Elect. Cond. (micromhos)	a		962	692	438	348	272	468	539	500	401	315	357	481
Elect. Cond. (micromhos)	b	1150	612	577	454	318	246	576	567	431		281	367	498
pH	c	8.0	7.3	9.0	8.0	7.6	7.0	7.2	7.1	8.1	7.0	7.6	7.0	8.09
Boron (mg/l)	b	0.3	0.1		0.3	0,3	0.1	0.2	0.1	0.2		0.1	0.1	0.17
Fluoride (mg/l)	b	0.2	0.2		0.2	0.2	0.0	0.1	0.1			0.1	0.1	0.12
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Selenium (mg/l)	b	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d		0.00											0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.01	0.01	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.14	0.03	0.04	0.03
Manganese (mg/l)	b	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Magnesium (mg/l)	b	28	16		11	8.1	6.0	15	13	11		7.7	9	12
Copper (mg/l)	b	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.02	0.03	0.01	0.02	0.02	0.02
Calcium (mg/l)	b	24	22		26	18	14	26	23	16		16	21	19
Zinc (mg/l)	b	0.00	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.59	0.02	0.02	0.06
Phenol (mg/l)	b d		0.000											0.000
Color (units)	b									18				
Sampling Date		1/17	2/14	3/14	4/18	5/16	6/20	7/18	8/15	9/19	10/17	11/14	12/19	

a - Weighted average resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
CALIFORNIA AQUEDUCT AT CHECK 29

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	657b	362	329	125	76	120	241	293	261	220	171	199	255
Total Hardness (mg/l)	a	173b	133	124	62	43	60	99	114	105	93	77	86	97
Chlorides (mg/l)	a	247b	100	87	20	10	19	55	73	61	48	32	41	66
Sulfates (mg/l)	a	69b	71	62	17	8	16	41	53	46	36	25	31	40
Sodium (mg/l)	a	158b	74	65	18	9	17	43	56	48	38	27	33	49
Sodium (%)	a	67b	55	53	39	33	38	49	52	50	44	43	46	47
Elect. Cond. (micromhos)	a		621	583	211	125	202	421	517	458	383	293	344	378
Elect. Cond. (micromhos)	b	1170	614	780c	180	131	204	587	491	435	405	277	367	470
pH	c	7.6	7.3	6.8	7.1	7.2	7.1	7.0	7.4	7.7	7.0	7.6	7.0	7.32
Boron (mg/l)	b	0.3	0.2	0.3	0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.0	0.1	0.13
Fluoride (mg/l)	b	0.2	0.2	0.4	0.2	0.2	0.0	0.1	0.1		0.0	0.0	0.0	0.13
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Selenium (mg/l)	b	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d		0.00											0.00
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.01	0.01	0.02	0.04	0.03	0.13	0.01	0.06	0.01	0.03	0.03	0.03	0.03
Manganese (mg/l)	b	0.00	0.00	0.01	0.01	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.01	0.01
Magnesium (mg/l)	b	30	18	19	2.1	2.4	5.1	15	11	11		7.9	9.2	12
Copper (mg/l)	b	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.02
Calcium (mg/l)	b	20	27	53	19	13	13	26	20	17	17	15	20	22
Zinc (mg/l)	b	0.01	0.02	0.02	0.04	0.01	0.02	0.00	0.07	0.01	0.06	0.02	0.01	0.02
Phenol (mg/l)	b													
Color (units)	b	10		23	28	23	23	20	18		13	18	18	19
Sampling Date		1/17	2/14	3/14	4/18	5/16	6/20	7/18	8/15	9/19	10/17	11/14	12/19	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALTIY
CALIFORNIA AQUEDUCT AT TEHACHAPI AFTERBAY

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	517b	340b	293	197	73	103	223	281	260	213	173	185	238
Total Hardness (mg/l)	a	168b	146b	120	89	43	55	97	116	109	94	81	85	100
Chlorides (mg/l)	a	151b	82b	77	43	10	17	52	72	65	48	36	39	58
Sulfates (mg/l)	a	67b	72b	57	34	9	15	40	54	49	37	28	31	41
Sodium (mg/l)	a	101b	57b	60	36	10	16	42	57	51	40	30	33	44
Sodium (%)	a	56b	45b	52	47	34	38	48	52	50	48	45	46	47
Elect. Cond. (micromhos)	a			538	362	131	192	409	515	478	392	319	341	368
Elect. Cond. (micromhos)	b	871	605	597	208	141	22.0	414	554	466	404	280	364	427
pH	c	8.3	8.0	8.3	7.8b	7.4	7.9	8.5	9.1	8.2	7.7	8.6	7.9	8.39
Boron (mg/l)	b	0.28	0.22	0.26	.01	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.17
Fluoride (mg/l)	b	0.4	0.2	0.2	.02	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.12
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.00	0.05	0.04	0.04	0.03	0.04	0.02	0.02	0.02	0.01	0.07	0.04	0.03
Manganese (mg/l)	b	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.01	.01
Magnesium (mg/l)	b	24	16	17	26	2.0	5.2	11	14	12	11	7.6	9.4	11
Copper (mg/l)	b	0.00	0.00	0.00	0.2	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	.01
Calcium (mg/l)	b	34	32	34	22	15	14	21	22	18	18	15	20	22
Zinc (mg/l)	b	0.05	0.01	0.01	0.01	0.01	0.02	0.00	0.03	0.01	0.02	0.00	0.02	.02
Phenol (mg/l)	b d													
Color (units)	b		35	33	13	23	18	18	18	15	10	13	8	19
Sampling Date		1/16	2/15	3/13	4/19	5/17	6/21	7/19	8/16	9/20	10/18	11/17	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
PYRAMID LAKE AT ENTRANCE TO ANGELES TUNNEL

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	307	363	419	392	403	209	204	178	207	360	349	260	304
Total Hardness (mg/l)	b	149	155	179	190	197	106	94	99	118	168	152	134	145
Chlorides (mg/l)	b	72	93	69	57	55	24	31	31	35	41	46	41	50
Sulfates (mg/l)	b	68	80	119	136	140	62	48	58	70	110	91	77	88
Sodium (mg/l)	b	57	70	60	60	57	30	30	32	36	43	44	41	47
Sodium (%)	b	45	49	42	40	38	37	40	41	40	35	38	39	40
Boron (mg/l)	b	0.2	0.28	0.4	0.3	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.2	.48
pH	c	8.4	8.0	9.0	9.4	9.5	8.1	8.8	8.6	8.7	8.1[b]	7.8	8.5	8.88
Elect. Cond. (micromhos)	b	604	687	675c	652	650	353	332	352	411	539	514	465	520
Fluoride (mg/l)	b	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.3	0.3	0.3	0.31
Lead (mg/l)	b	0.00	0.00	0.01		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00		0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.00	0.01	0.01		0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Manganese (mg/l)	b	0.00	0.00	0.01		0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00
Magnesium (mg/l)	b	16	17	18	19	20	9.2	8.8	9.4	11	16	15	13	14
Copper (mg/l)	b	0.02	0.00	0.00		0.00	0.01	0.06	0.00	0.00	0.00	0.00	0.01	.01
Calcium (mg/l)	b	33	34	42	45	46	27	23	24	36	41	36	32	35
Zinc (mg/l)	b	0.00	0.01	0.01		0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.1	.01
Phenol (mg/l)	b d													
Color (units)	b		5	18	28	18	15	18	8	4	8	4	8	12
Sampling Date		1/20	2/16	3/17	4/20	5/18	6/20	7/18	8/15	9/20	10/17	11/16	12/22	

b - Laboratory analysis of monthly samples
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
CASTAIC LAKE AT OUTLET WORKS

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	370	305	342	315	341	374	317	337	399	432	439	403	365
Total Hardness (mg/l)	b	190	170	171	182	187	199	194	189	204	210	201	195	191
Chlorides (mg/l)	b	51	61	52	51	51	54	54	54	54	55	54	52	54
Sulfates (mg/l)	b	100	90	93	102	110	116	120	126	128	132	125	123	114
Sodium (mg/l)	b	45	50	46	46	46	50	50	51	53	51	49	52	49
Sodium (%)	b	34	39	36	35	34	35	36	36	36	34	34	36	35
Boron (mg/l)	b	0.24	0.25	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.27
pH	c	8.0	7.4	9.3	8.1	8.7	8.7	8.5	8.6	7.5	8.1	8.0[b]	8.2	8.56
Elect. Cond. (micromhos)	b	616	613	620	580	594	605	612	610	644	645	628	616	615
Fluoride (mg/l)	b	0.5	0.4	0.4	0.4	0.5	0.5	0.6	0.5	0.5	0.5	0.3	0.4	0.46
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Manganese (mg/l)	b	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
Magnesium (mg/l)	b	17	16	16	17	17	18	18	18	18	19	18	17	17
Copper (mg/l)	b	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01
Calcium (mg/l)	b	48	42	42	45	47	50	48	46	52	53	51	50	48
Zinc (mg/l)	b	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
Phenol (mg/l)	b d													
Color (units)	b	4	4	10	8	8	5	8	3	8	8	6	3	6
Sampling Date		1/18	2/15	3/14	4/17	5/15	6/19	7/17	8/14	9/19	10/16	11/14	12/19	

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

*Some values corrected for Jan. and Feb.

WATER QUALITY
CALIFORNIA AQUEDUCT AT PEARBLOSSOM PUMPING PLANT

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	413b	361b	331b	175	87	109	243	315	295	232	181	171	243
Total Hardness (mg/l)	a	144b	161b	139b	82	54	61	103	125	119	100	84	81	104
Chlorides (mg/l)	a	120b	81b	82b	37	3.4b	19	58	83	76	54	38	35	57
Sulfates (mg/l)	a	58b	98b	67b	24	12b	25b	47	71	64	43	26	23	47
Sodium (mg/l)	a	82b	62b	56b	31	13	17	46	63	58	43	32	30	44
Sodium (%)	a	55b	45b	46b	45	34	37	49	52	51	48	45	44	46
Elect. Cond. (micromhos)	a				320	158	198	445	577	541	425	331	312	367
Elect. Cond. (micromhos)	b	730	651	573	217	152	243	542	617	496	405	288	348	439
pH	c	8.5	8.6	10.4	8.1b	7.8	8.1	8.4	9.1	8.9	8.7	8.6	7.9	9.39
Boron (mg/l)	b	0.24	0.14	0.19	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.16
Fluoride (mg/l)	b	0.4	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.17
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00		0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.00	0.03	0.02	0.10	0.14	0.03	0.01	0.02	0.02	0.02	0.06	0.06	0.04
Manganese (mg/l)	b	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.01
Magnesium (mg/l)	b	18	16	15	37	2.1	6.0	14	15	12	10	7.9	8.7	10.7
Copper (mg/l)	b	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01
Calcium (mg/l)	b	28	38	31	21	16	15	25	26	19	18	16	19	23
Zinc (mg/l)	b	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.03	0.00	0.01	0.00	0.02	.01
Phenol (mg/l)	b d													
Color (units)	b		35	33	23	18	18	18	18	15	13	8	8	17
Sampling Date		1/17	2/15	3/15	4/19	5/17	6/21	7/19	8/16	9/20	10/18	11/17	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
CALIFORNIA AQUEDUCT AT INLET TO MOJAVE SIPHON

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	a	459b	374b	320b	121b	79	92	204	279	265	213	172	166	229
Total Hardness (mg/l)	a	139b	156b	139b	66b	45	51	91	115	111	94	80	79	97
Chlorides (mg/l)	a	133b	88b	77b	82b	12	14	45	71	66	48	35	34	53
Sulfates (mg/l)	a	60b	83b	67b	25b	10	13	35	53	50	37	28	27	41
Sodium (mg/l)	a	90b	60b	54b	17b	11	14	38	56	53	40	30	29	41
Sodium (%)	a	58b	45b	45b	35b	35	37	47	51	51	48	45	45	45
Elect. Cond. (micromhos)	a					148	172	375	511	486	391	317	307	338
Elect. Cond. (micromhos)	b	768b	649	559	222	155	229	420	470	474	415	315	368	420
pH	c	8.6	8.6	9.8	8.3b	7.9	8.1	8.6	9.4	8.8	8.7	8.3	8.2	9.00
Boron (mg/l)	b	0.20	0.20	0.16	0.2	0.0	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.16
Fluoride (mg/l)	b	0.3	0.1	0.2	0.8	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.18
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium(mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.01	0.03	0.03	0.04	0.04	0.00	0.02	0.03	0.02	0.01	0.05	0.03	0.03
Manganese (mg/l)	b	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.01
Magnesium (mg/l)	b	18	15	15	39	2.5	5.3	11	12	12	11	8.8	9.4	10.3
Copper (mg/l)	b	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.02	0.01
Calcium (mg/l)	b	26	38	31	20	15	16	21	21	18	18	16	20	22
Zinc (mg/l)	b	0.00	0.03	0.00	0.01	0.01	0.02	0.00	0.03	0.00	0.02	0.00	0.01	0.01
Phenol (mg/l)	b d													
Color (units)	b		35	28	18	18	15	18	13	15	10	8	8	17
Sampling Date		1/17	2/16	3/15	4/19	5/17	6/21	7/19	8/16	9/20	10/18	11/15	12/20	

a - Weighted averages resulting from flow and correlation with continuous electrical conductivity.
b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
SILVERWOOD LAKE AT OUTLET TO MOJAVE RIVER

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	428	377	242	238	175	129	164	246	268	260	248	165	245
Total Hardness (mg/l)	b	149	135	88	112	80	60	66	91	104	94	86	76	95
Chlorides (mg/l)	b	124	121	70	64	32	17	27	58	79	70	58	42	64
Sulfates (mg/l)	b	67	60	36	59	34	20	26	38	42	34	28	28	39
Sodium (mg/l)	b	88	80	48	50	29	19	26	42	53	49	43	35	47
Sodium (%)	b	55	55	53	49	43	40	45	49	52	52	51	49	49
Boron (mg/l)	b	0.26	0.22	0.13	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.16
pH	c	8.7	8.0b	7.4	8.4	9.0	7.5	8.6	7.5	7.5	7.7	7.5	7.8	8.32
Elect. Cond. (micromhos)	b	762	720	436	483	320	212	260	391	489	443	394	331	437
Fluoride (mg/l)	b	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.16
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium(mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.00	0.02	0.03	0.00	0.01	0.01	0.03	0.02	0.01	0.00	0.01	0.01	0.01
Manganese (mg/l)	b	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01
Magnesium (mg/l)	b	18	17	10	15	6.8	4.4	5.9	10	12	12	10	8.7	10.8
Copper (mg/l)	b	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Calcium (mg/l)	b	30	26	19	20	21	17	17	20	22	18	18	16	20
Zinc (mg/l)	b	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Phenol (mg/l)	b d													
Color (units)	b	5	10	25			8	8	8	13	8	6	10	11
Sampling Date		1/16	2/16	3/13	4/17	5/15	6/19	7/17	8/15	9/18	10/19	11/15	12/20	

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
SILVERWOOD LAKE AT INLET TO SAN BERNARDINO TUNNEL

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.*	Annual Average
Total Dissolved Solids (mg/l)	b	345	356	271	252	178	128	167	195	266	276	254		244
Total Hardness (mg/l)	b	116	128	88	105	80	59	69	88	102	97	86		93
Chlorides (mg/l)	b	86	114	70	62	32	16	28	54	75	70	61		61
Sulfates (mg/l)	b	48	59	36	53	35	20	27	36	41	34	28		38
Sodium (mg/l)	b	62	78	49	48	30	20	26	40	52	47	45		45
Sodium (%)	b	53	56	54	49	44	41	44	49	52	50	52		49
Boron (mg/l)	b	0.26	0.20	0.08	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1		0.16
pH	c	7.7	8.0b	7.5	8.6	8.5	7.5	8.7	7.7	7.8	8.8	7.5		8.27
Elect. Cond. (micromhos)	b	565	68b	445	466	319	212	264	391	474	449	399		425
Fluoride (mg/l)	b	0.3	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.0		0.17
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Selenium (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00		
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Iron (mg/l)	b	0.00	0.02	0.13	0.01	0.03	0.01	0.03	0.03	0.00	0.02	0.01		0.03
Manganese (mg/l)	b	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.00		0.01
Magnesium (mg/l)	b	13	16	10	14	7.2	4.0	5.9	9.2	12	12	10		10.3
Copper (mg/l)	b	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00		0.01
Calcium (mg/l)	b	25	25	19	19	20	17	18	20	21	19	18		18
Zinc (mg/l)	b	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00		0.01
Phenol (mg/l)	b d													
Color (units)	b	18	10	23		18	8	8	10	13	8	4		12
Sampling Date		1/16	2/16	3/13	4/17	5/15	6/19	7/17	8/15	9/18	10/19	11/15		

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.
* Adverse weather conditions prevented sampling for December

WATER QUALITY
DEVIL CANYON AFTERBAY

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	333	360	265	340	156	139	170	156	292	288	227	152	240
Total Hardness (mg/l)	b	116	138	102	106	80	60	69	88	104	92	86	76	93
Chlorides (mg/l)	b	85	126	81	62	31	17	29	54	75	71	58	41	61
Sulfates (mg/l)	b	49	65	40	58	27	22	28	36	41	36	31	25	38
Sodium (mg/l)	b	60	86	56	49	27	21	25	41	52	51	43	33	45
Sodium (%)	b	52	57	54	49	41	42	43	49	51	54	51	48	49
Boron (mg/l)	b	0.16	0.18	0.10	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.15
pH	c	8.1	8.4	7.5	8.0b	8.4	7.9	7.7	8.9	8.3	8.1	8.7	7.9	8.33
Elect. Cond. (micromhos)	b	564	734	500	456	315	217	268	392	477	449	394	315	423
Fluoride (mg/l)	b	0.3	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.17
Lead (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.01	0.00	0.01	0.01	0.02
Manganese (mg/l)	b	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.01
Magnesium (mg/l)	b	13	17	12	10	6.6	3.7	5.8	9.2	12	10	10	8.6	9.8
Copper (mg/l)	b	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.01	0.01	0.01
Calcium (mg/l)	b	25	27	21	26	21	18	18	20	22	19	18	16	21
Zinc (mg/l)	b	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.01	0.01	0.01
Phenol (mg/l)	b d													
Color (units)	b		15	20	18	18	8	13	8	8	10	3	8	12
Sampling Date		1/17	2/15	3/15	4/19	5/17	6/22	7/19	8/16	9/21	10/18	11/15	12/20	

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
LAKE PERRIS AT INLET

1978

Constituents		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Total Dissolved Solids (mg/l)	b	380	320	305	396	308	332	281	373	340	328	343	266	331
Total Hardness (mg/l)	b	144	144	144	144	139	146	146	142	142	134	128	114	139
Chlorides (mg/l)	b	78	88	85	86	82	81	86	88	85	83	84	72	83
Sulfates (mg/l)	b	50	55	51	56	52	56	55	58	55	51	46	44	52
Sodium (mg/l)	b	64	68	68	66	60	64	66	70	66	62	62	54	64
Sodium (%)	b	48	50	50	49	47	48	49	51	49	49	50	50	49
Boron (mg/l)	b	0.24	0.19	0.27	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.22
pH	c	8.1	8.5	9.0	8.7	8.7	9.0	8.7	8.4	8.5	8.4	7.9[b]	8.0	8.61
Elect. Cond. (micromhos)	b	619	651	595	597	584	586	602	617	609	588	547	385	582
Fluoride (mg/l)	b	0.4	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.23
Lead (mg/l)	b	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (mg/l)	b	0.00	0.00	0.00		0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Hexavalent Chromium (mg/l)	b d													
Arsenic (mg/l)	b	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron (mg/l)	b	0.00	0.01	0.00		0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01
Manganese (mg/l)	b	0.00	0.00	0.01		0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Magnesium (mg/l)	b	15	16	16		15	16	16	15	15	15	14	13	15
Copper (mg/l)	b	0.00	0.01	0.00		0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01
Calcium (mg/l)	b	33	31	31		31	32	32	32	32	29	28	24	31
Zinc (mg/l)	b	0.00	0.01	0.01		0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01
Phenol (mg/l)	b d													
Color (units)	b		5	8		8	3	8	2	3	8	3	5	5
Sampling Date		1/16	2/15	3/14	4/18	5/15	6/20	7/18	8/16	9/19	10/18	11/16	12/19	

b - Laboratory analysis of monthly samples.
c - Field analysis of monthly samples.
d - Sampling performed twice annually.

WATER QUALITY
PESTICIDES IN CALIFORNIA AQUEDUCT
(in parts per billion)
1978

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Delta Pumping Plant												
Chlorinated Hydrocarbons		.02			.00							
Organic Phosphorous		-			.02							
Herbicides		.2			--							
Combinations of C,P, and N types		.04			--							
Discharge from O'Neill P.P.												
Chlorinated Hydrocarbons		-			.00						--	
Organic Phosphorous		-			.02						--	
Herbicides		.34			--						.00	
Compinations of C,P, and N types		.64			.01						--	
Near Kettleman City (Check 12)												
Chlorinated Hydrocarbons		.03	.02		37.15					.03	--	
Organic Phosphorous		-	.11		.03					--	--	
Herbicides		.09	.62		--					.00	.00	
Combinations of C,P, and N types		.12	.19		--					--	--	
Tehachapi Afterbay												
Chlorinated Hydrocarbons		.13		.00	.00			--				
Organic Phosphorous		-		.05	.13			--				
Herbicides		.40		--	--			.31			.25	
Combinations of C,P, and N types		-		--	--			--			--	

C - Chlorinated Hydrocarbons

P - Organic Phosphorous

N - Organic Nitrogen